The Atal Tinkering Lab Handbook

Nayee Dishayein Naye Nirmaan

Naya Bharat

January 2019

" When I see the young generation busy in innovation with enthusiasm like this, my resolve for 'New India' gets stronger. In the 21st century we will be able to get India the place in the world it deserves. "

Sh. Narendra Modi
Hon'ble Prime Minister of India

Dr. Rajiv Kumar
VICE CHAIRMAN
NITI Aayog

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Foreword

India is embarking on an exciting journey through innovation. The various complex challenges that we face today provide immense opportunities for the innovative youth of our country to go beyond and create value, not only for India but also for the world.

The Atal Innovation Mission (AIM), NITI Aayog is a first of its kind intervention by the Govt. of India to foster the spirit of innovation and entrepreneurship in India. The Atal Tinkering Labs (ATL) in schools are revolutionizing education like never before with young student innovators coming up with some very interesting concepts and prototypes. I have personally experienced the energy and vibrancy of an Atal Tinkering Lab and am witness to the impact they are creating amongst the young students.

I commend the AIM team for coming up with the ATL Handbook which can further help schools to improve productivity of ATLs and make us more successful in our efforts. My best wishes to all ATL students, teachers and mentors for their energy and dedication in taking this Mission forward.

(Rajiv Kumar)

स्वच्छ भारत
एक कदम स्वच्छता की ओर

“I dream of an India that is prosperous, strong and caring. An India that regains a place of honour in the comity of great nations.”

Late Shri Atal Bihari Vajpayee
Former Prime Minister of India

Shri Amitabh Kant
CEO
NITI Aayog

अमिताभ कांत
Amitabh Kant
मुख्य कार्यकारी अधिकारी
Chief Executive Officer

Message

Atal Innovation Mission, the flagship programme of NITI Aayog, has been establishing Atal Tinkering Labs across India. With an ambitious target of establishing ATLs in over 5,400 schools and covering all major districts and Aspirational Districts of India by March 2019, and 10,000 schools by 2020 eventually, AIM is well poised to change the face of the traditional Indian education system.

Equipped with the latest technologies, our young students are now capable of solving any problem in their labs by creating innovative prototypes, and eventually becoming an entrepreneur. India really needed ATLs and the way AIM has been successfully able to implement the programme in such a short time, I have great hopes that India of 2030 will be a high skilled, innovative and entrepreneurial nation.

It's great to see the AIM Team coming up with this ATL Handbook, for schools to emulate the guidelines and reach their fullest potential. I urge the states to use this as an implementation code and establish more ATLs with the support of AIM. My best wishes to everyone contributing towards this national movement, with the best of their efforts.

(Amitabh Kant)

Place: New Delhi
Date: 09.01.2019

“ The ignited minds of the youth is the most powerful resource on the Earth. ”

Late Dr. A.P.J. Abdul Kalam
Former President of India

Shri Ramanathan Ramanan
Mission Director
Atal Innovation Mission,
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संसद मार्ग, नई दिल्ली
Mission Director, Atal Innovation Mission
Additional Secretary, NITI Aayog
Government of India
Sansad Marg, New Delhi

Message

Atal Innovation Mission (AIM), NITI Aayog has embarked on a strategic nationwide initiative to create, nurture and promote an ecosystem of innovation and entrepreneurship across the country in a holistic manner - across schools, universities and the industry.
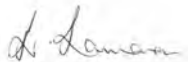
At a school level the Atal Tinkering Labs (ATLs) is a game changing disruptive initiative to embed problem solving innovative mindsets in millions of high school children. ATLs are facilitating transformational changes in technological innovation and pedagogy.

With more than 5,000 schools being equipped with ATLs by mid-2019, this will help greatly expand the reach of the ATL program, increasing the number of children exposed to tinkering and innovation and providing our budding young innovators access to technologies like 3D Printing, Robotics, IoT and microprocessors. It is expected that these schools will facilitate the creation of over **One Million Neoteric Child Innovators** by 2020. ATLs will function as innovation hubs for these student innovators to explore solutions to unique local problems, which they come across in their everyday lives.

AIM also envisions a strong growth in the collaborative ecosystem created by the ATL initiative, where students, teachers, mentors and industry partners work to facilitate innovation, foster scientific temper and an entrepreneurial spirit in the children of today, who will go on to become successful contributors to nation-building.

We are happy to launch the ATL Handbook, which can be used by the existing ATL schools to improvise on their operations. The handbook can also be used by authorities to establish more ATLs, by implementing the guidelines and learning from our experiences at AIM.

My best wishes to all innovators.

(R.Ramanan)

Message

Our purpose at Dell is to create technologies that drive human progress. We are passionate about making a difference to the world through a technology-led approach balancing social inclusion, innovation and entrepreneurship.

In that context, our partnership with NITI Aayog is central to our organization purpose. We are honoured and privileged to have supported the drive for innovation through Atal Innovation Mission, provided a blueprint for higher adoption of "Digital" in delivery of citizen services and support the government initiative on "Skill India", jointly with NITI.

Atal Tinkering Labs, a part of the Atal Innovation Mission, is a unique initiative where workspaces are established in government schools with support from NITI Aayog to introduce a culture of innovation and entrepreneurship amongst school students. Given our proven legacy of innovation, Dell EMC is leading the efforts in making technology an enabler for the progress of the younger generation.

Our expertise in the domain has helped us mentor and guide students by lending robust support in their journey of creative tinkering. This has further assisted driving positive and impactful outcomes. This program has immense potential to identify talent, awaken curiosity and produce creative thinkers who will provide solutions to real world challenges.

We are excited to partner with NITI Aayog in promoting the 'maker' spirit and are optimistic that this initiative will evoke the entrepreneurial spirit in the youth spurring innovation far and wide. We look forward to a journey creating more innovators and entrepreneurs powering the "New India".

Alok Ohrie

Alok Ohrie
President & Managing Director
DellEMC India

Dr. Anjlee Prakash
Chairperson
Learning Links Foundation

Message

Albert Einstein once said, "I have no special talent. I am only passionately curious."

In an era governed by innovation in everything that is being done and how it is being done, it is 'curiosity' and 'creativity' that take the centre stage. They are at the heart of solving the most complex global problems. If we want to raise the next generation to be inquisitive problem-solvers, prepared to lead change than merely adapt to change, then we need to ensure they get ample opportunities to explore and experiment. To this end, NITI Aayog's flagship initiative 'Atal Innovation Mission' promotes innovation and entrepreneurship across the length and breadth of the country. This is definitely the kind of move that was much needed to foster curiosity and creativity among children such that they become builders of a better tomorrow.

It gives me immense pleasure to contribute to the work being done by the Atal Innovation Mission. As a Mentor-of-Change, I have had the opportunity to closely observe the change that the Atal Tinkering Labs (ATL) have brought not only in the way students learn, but more importantly in how they apply their learning to address the problems in their communities. There is a remarkable shift in that students are more interested in trying out new ways of doing things and eager to share their ideas. They are also developing new age skills such as collaboration, problem solving, creativity and critical thinking to meet the demands of the complex and volatile future environment. Students of schools where ATL initiatives are being led by Learning Links Foundation have also won accolades on international platforms.

The journey so far has been incredible and promises to be even more so as tinkering continues to be introduced in schools across the country. It is an honour for Learning Links Foundation to be a partner in an initiative that raises education in India to the next level. I wish Atal Innovation Mission all the success in its future endeavours.

Dr. Anjlee Prakash

Preface

Our former Prime Minister late Shri Atal Bihari Vajpayee Ji believed that the future of this country lies in the hands of youth and the Atal Innovation Mission, named after his legacy, is an effort towards translating his dreams into reality.

Atal Innovation Mission is a flagship initiative of the Government of India, housed at NITI Aayog, with a focus to build an innovative and entrepreneurial ecosystem across India, with public-private partnerships. The Atal Tinkering Lab initiative is aimed at disrupting the Indian education system. It is creating a paradigm shift, where children as young as 12 years of age are being introduced to the world of technology innovation, and are experiencing a culturally different micro-environment in Indian schools, which allows them to work in their area of interest without a fixed curriculum. With ATL, problem solving has become an integral part of their behavior. The tinkering lab mission is fueling a nationwide mass movement and creating millions of young high school innovators at the grassroots. It is also systematically honing young students on crucial 21st century skills including Creativity, Innovation, Critical Thinking, Social and Cross-Cultural Collaboration, Ethical Leadership and so on.

The Atal Tinkering Lab is based on the philosophy that incentives are a great beginning to create an exponential wave of innovation and entrepreneurship amongst school children. Young children are keen to receiving mentoring support to take their innovations to the next level and test them with potential users. The effort has been to build an inclusive model for innovation by providing an equal opportunity to all regions and to all children irrespective of the rural-urban divide and government-private divide, by public- private partnership.

The Atal Tinkering Lab Handbook is an attempt to capture the three key elements of the tinkering movement in India, that was launched in 2016. First, the application and selection process for establishing an Atal Tinkering Lab in any school in India or globally has been described. Second, the methodologies for creating a vibrant community by engaging students, teachers, mentors, parents, local community members, academic institutions and private industry has been discussed. Some of the successful case studies representing the different states of India have also been highlighted here. Third, the outcome and impact that is being created by the Atal Tinkering Lab has been showcased, including some examples of celebrating and rewarding innovation over the last two years.

We have followed a deeply participative approach in preparing The Atal Tinkering Lab Handbook. It captures observations, insights, experiences and case studies from some of the finest Atal Tinkering Labs across India. Constant feedback has been captured from multiple stakeholders to improvise the overall experience of tinkering and innovation for schools and mentors, and some of the key learnings are being shared here in The Atal Tinkering Lab Handbook.

The attempt is to present an action plan that can provide the basis for a smooth scale up approach for the Atal Tinkering Lab initiative, through the public-private-partnership and center-state cooperation. The intended audience of the Handbook includes school management, ATL in-charges, student innovators, mentors, corporate organizations, state government authorities among several others, each of them having a specific role to play to ensure the initiative reaches its true potential. We hope that the document will also bring on board additional stakeholders towards creating a sustainable approach for tinkering and innovation at the high school level.

I take this opportunity to thank NITI Aayog Vice-Chairman Dr. Rajiv Kumar, CEO Mr. Amitabh Kant and Mission Director Mr. Ramanathan Ramanan, Atal Innovation Mission, for their spirited leadership and continuous support towards making ATL a national movement across India. I also express my sincere gratitude and thankfulness to all members of AIM's Mission High Level Committee, including Prof. K. VijayRaghavan and Dr. Renu Swarup, members of NITI Aayog family, including Ms. Anna Roy, Dr. Muralikrishna Kumar and Mr. U K Sharma, who have been continuously guiding and supporting us towards creating the vision of AIM, and encouraging us at every step in our journey.

My sincere gratitude to the Ministry of Human Resource Development, Department of Biotechnology, Department of Science & Technology, Cell for Intellectual Property Rights Promotion and Management, Startup India, Invest India, and Department of Industrial Policy and Promotion, for their contribution towards enhancing the overall impact of ATL, through several innovative engagement initiatives.

ATL in a nationwide program, and would require both center and state to work together to make it a huge success at the grassroots. I would like to particularly mention the efforts of the State Governments of Chhattisgarh, Maharashtra, Telangana, Andhra Pradesh and Gujarat for their pro-active participation in the ATL program implementation in their respective states.

My special acknowledgement for the co-operation and support received from IIT Delhi, IIT Bombay and all our partners including Intel, IBM, DELL, Learning Links Foundation, FICE, KPIT, Microsoft, Network Capital, SAP, Stratasys, tGELF, All India Council for Technical Education, Workbench projects, Maker's Asylum, T-Works, Encube Labs and The Better India, for their contribution and commitment towards building a vibrant community of tinkering and innovation in India. I thank the AIM incubators, C-CAMP, Amrita TBI, Aartech and TREC-STEP who supported the ATL Student Innovator Program, while helping students in furthering their innovative ideas. I thank all our Super Mentors who have inspired our young innovators with their stories, as they tread the path of innovation.

My special words of praise and thankfulness to the entire ATL community, mentors, teachers, student innovators and parents for being a continuous source of inspiration to the AIM team. It has been a wonderful team effort that

has resulted in some of the initial success stories for ATL. I would also like to thank my colleagues at AIM, Dr. Unnat Pandit, Mr. Mudit Narain, Ms. Ishita Agarwal, Mr. Arnab Kumar, Mr. Saksham Saxena, Ms. Dandapani Varsha, Ms. Aditi Banerjee, Mr. Vedant Sharma, Mr. Akshat Bagla, Mr. Tarang Gupta, Mr. Desh Gaurav Sekhri, late Ms. Suparna Jain, Ms. Pavithra S. Rangan, Mr. Manan Kapur, Ms. Avantika Bahl, Ms. Saima Nafis and Mr. Umar Ahmad, for relentlessly supporting us in all the initiatives for ATL. Dr. Ashish Nayan, Mr. Ronak Jogeshwar from AIM and the Dell-Learning Links Foundation team worked hard and provided invaluable support to me during the framing and scribing of this book.

This book is an effort towards capturing and showcasing how the Atal Tinkering Lab initiative is working at the grassroots in different parts of the country, to help students and teachers transform into innovators and develop an entrepreneurial mindset, which will pave the way forward for developing a 'New India' by 2022. So, let us together explore the world of Atal Tinkering Lab and empower our young minds to innovate!

Happy Tinkering ☺

Dr. Ayesha Chaudhary
Atal Innovation Mission
NITI Aayog

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Note: *This document contains several weblinks and associated QR codes. The relevant documents and videos can be accessed either by clicking the weblink or by scanning the QR code using a QR code scanner application, which can be downloaded on any smartphone via the application store.*

List of Abbreviations

Abbreviation	Definition
ATL	Atal Tinkering Lab
AIC	Atal Incubation Centre
ARISE	Atal Research and Innovation in Small Enterprises
ANIC	Atal New India Challenges
MoC	Mentor of Change
PFMS	Public Finance Management System
MoA	Memorandum of Agreement
AAB	ATL Advisory Body
GeM	Government e-Marketplace
CSR	Corporate Social Responsibility
SIP	Student Innovator Program
MSME	Micro, Small and Medium Enterprises
IP	Intellectual Property

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Genesis of the Atal Tinkering Lab

Connecting science, technology and innovation with societal outcomes, will drive strong economic and social progress for India. A whole range of structural reforms are being undertaken to place India on the global map of innovation. Strong linkages are being created between academia, government, and industry, to create an enabling environment, that not just breeds scientific aptitude leading to innovation, but also nurtures a creative and innovative mindset at a young age, to accelerate growth for a New India[1]. The traditional Indian education system has not been able to address the fast-changing requirements of the industry, and it was imperative that the school education in India may be redefined with innovation. This book recounts the story of the first of its kind and largest ever government led initiative in the history of India, introduced to disrupt the Indian education system and empower young students with 21st century skills including creativity, innovation, critical thinking, social and cross-cultural collaboration, ethical leadership and so on, and thereby create a New India.

1.1 NITI Aayog

The National Institution for Transforming India, also called NITI Aayog, was formed via a resolution of the Union Cabinet on January 1, 2015. NITI Aayog is the premier policy 'Think Tank' of the Government of India, providing both directional and policy inputs. While designing strategic and long-term policies and programs for the Government of India, NITI Aayog also provides relevant technical advice to the Center and States.

The Government of India, in keeping with its reform agenda, constituted the NITI Aayog to replace the Planning Commission instituted in 1950. This was done in order to better serve the needs and aspirations of the people of India. An important evolutionary change from the past, NITI Aayog acts as the quintessential platform of the Government of India to bring states to act together in national interest, and thereby fosters cooperative federalism.

NITI Aayog is also developing itself as a State-of-the-Art Resource Centre, with the necessary resources, knowledge and skills, that will enable it to act with speed, promote research and innovation, provide strategic policy vision for the government, and deal with contingent issues.

The prime responsibilities of the NITI Aayog are:

- To evolve a shared vision of national development on priority sectors and develop strategies with the active involvement of states, in light of the nation's objectives

- To develop mechanisms to formulate credible plans at the grassroots level and aggregate these progressively at higher levels of government

- To pay special attention to the sections of our society that need special attention to enable them to join the national economic progress

- To design strategic and long-term policy and program frameworks

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[1] India 2020: A Vision for the New Millennium, 1998

- To create a knowledge, innovation and entrepreneurial support system through a collaborative community of national and international experts, practitioners and other partners.

- NITI Aayog has also been nominated as the nodal agency by the United Nations to monitor, coordinate and effectively implement the 17 Sustainable Development Goals across the country to bring about the desired transformation.

1.1.1 Composition of NITI Aayog

A high-level team comprising of the Prime Minister as its Chairman, Governing Council including Chief Ministers of the States and Lt. Governors of the Union Territories, experts and specialists from various fields and the Regional Council work together to achieve the goals and objectives of the NITI Aayog.

1.2 Atal Innovation Mission

Atal Innovation Mission (AIM) is a flagship initiative of the Government of India, housed at the NITI Aayog, to promote innovation and entrepreneurship across the length and breadth of the country.

AIM under NITI Aayog is envisaged as an umbrella innovation organization that would play an instrumental role in alignment of innovation policies between central, state and sectoral ministries, by incentivizing the promotion of an ecosystem of innovation and entrepreneurship at various levels - higher secondary schools, higher educational and research institutions, and SME/MSME industry, corporate, and government ministerial level, by public-private partnership.

The initial focus has been towards creating an institutional framework, to nurture innovation and entrepreneurial mindset. Through the Atal Tinkering Labs (ATL), AIM is fostering innovation at school level, wherein students get an opportunity to experience design thinking and widen their intellectual horizons in pursuit of solutions to day-to-day problems and showcase their innovations at prestigious platforms. The Mentor of Change (MoC) Program is another citizen led national movement being led by AIM, wherein skilled professionals provide pro-bono mentoring to young ATL innovators, with a strong sentiment towards nation building. AIM's Atal Incubation Centres (AICs) are creating world-class ecosystems for start-ups to flourish, with the required handholding including access to mentoring and investor networks. AIM realised the importance of making innovation a national movement, wherein citizens felt the responsibility to create impact and contributed towards the same. Launched by AIM in collaboration with five Ministries of the Government of India, the Atal New India Challenges (ANIC) provided innovators an opportunity to propose technological solutions in 24 different areas of national importance. The selected innovations shall receive grant-in-aid along with support for swift productization and commercialisation. And finally, another program, in the final stages of conceptualization, AIM-Atal Research and

Innovation in Small Enterprises (ARISE) encourage the Ministries to invest in research and innovation, and thereby accept innovation from small enterprises into the public system, through a comprehensive framework for procurement.

1.3 Introduction to Atal Tinkering Lab

With AIM under NITI Aayog, innovation and entrepreneurship have become an integral part of our national mission, and children as young as 12 years of age are being introduced to the world of technology innovation, with ATL in schools. ATL is the flagship initiative of AIM, Government of India, to nurture an innovative mindset amongst high school students across the length and breadth of India.

The Atal Tinkering Lab program derives its essence from the ancient Indian Gurukul education system and world's most successful Finish education system, focusing on self-learning methodology, hands-on practical training and exposure to real-world situations[2]. ATL fosters curiosity and lets innovators start young. Students are free to think and explore, try and fail, even come up with something out of the box. The program is designed to equip students with the 21st century skills such as design thinking, critical thinking, computational thinking, digital fabrication, collaboration taking inspiration from the Stanford India Biodesign program, which was an initiative of Department of Biotechnology, Government of India, All India Institute of Medical sciences Delhi, Indian Institute of Technology Delhi and Stanford University[3]. It will enable India to create a dent in the Global Maker's movement[4] (Dougherty, 2012) and become a global platform for world-class innovation. ATL is encouraging students and teachers to experiment, explore and follow a self-learning path, thereby empowering them to think differently about problems and develop innovative solutions, by leveraging latest technology tools including 3D printing, Internet of Things, robotics, miniaturized electronics, space technology, drone technology, technology inspired textiles and so on. ATL is also providing other sections of the community including parents, mentors and other individuals interested in innovation to give life to their ideas. Through frequent community sessions, ATL is shaping an ecosystem wherein every individual can contribute towards finding solutions to day-to-day problems of the society and the country, henceforth creating a strong essence of national service[5].

Under the ATL scheme, grant-in-aid of up to ₹ 20 lakh is provided to schools selected for setting up an ATL. The grant must be spent exclusively for the specified purpose within the stipulated time of a maximum period of 5 years, with Rs.10 lakh for capital expense and remaining Rs.10 lakh for operational and maintenance expenses.

As of December 2018, more than 5,000 ATLs have been announced, covering 87% of all the districts and 110 Aspirational Districts of India. These labs, established in both government. and private schools and majority in co-

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[2] Teachers Day 2018: Young Teachers Transforming Into Modern Age 'Gurus', Business World, 2018
[3] Why it is important to create and foster entrepreneurial mindset in India's high school students, YourStory, 2018
[4] Dougherty, D. (2012). The Maker Movement. *Innovations*
[5] Finding Life's Purpose In Empowering Young Students To Innovate, Business World, 2018

educational and girls' schools, are serving as community hubs of innovation, while transforming the way India learns, thinks, ideates and innovates. As per the Strategy for New India[6] published by NITI Aayog, AIM shall establish over 10,000 ATLs by 2020.

1.3.1 Significance of Atal Tinkering Lab for India

Combining the traditional teaching methodologies with today's experiential learning will be the key towards creating a unique blended education system in India. Keeping in mind the demands of the growing economy and global growth in innovation development, the Government of India, embarked on a noble mission to create an ecosystem that nurtures futuristic skills like complex problem solving, critical thinking, adaptive learning, computational skills in children, with a vision to create 1 million neoteric innovators, with the ATL initiative. The ATL initiative, across India today, is tapping on the intrinsic imaginative and problem-solving knack of children and equipping them with the required skills of the future. Access to multiple ATL resources is helping them to ideate and create feasible solutions to substantial problems plaguing the community.

A video explaining the relevance of ATL for India can be downloaded here:
https://www.youtube.com/watch?v=f4Sqd6RDloE

Further, the support of students, teachers, principals and parents is considered crucial in successfully achieving the objectives of ATL. The overall goal is to disrupt the Indian education system, and create an army of young innovators ready to take on the further challenges, in their constant pursuit to build the New India.

1.3.2 Objectives of Atal Tinkering Lab

The major objectives of establishing ATL include the following:

a. To create workspaces where young minds can learn innovation skills, sculpt ideas through hands-on activities, work and learn in a flexible environment.

b. To empower our youth with the 21st century skills of creativity, innovation, critical thinking, design thinking, social and cross-cultural collaboration, ethical leadership and so on.

c. To help build innovative solutions for India's unique problems and thereby support India's efforts to grow as a knowledge economy.

1.3.3 Program Design of Atal Tinkering Lab

The ATL program design systematically helps the ATL In-charge to nurture the innovation mindedness amongst the young innovators. Beyond innovation, while engaging in ATL activities, students are benefitting on their

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[6] Strategy for New India@75, NITI Aayog, 2018

overall personality development, soft skills, technology skills and the 21st century skills.

The ATL introduces Indian students to a very different microenvironment, that allows freedom to explore new ideas, test them, and follow a 'learning by doing' approach[7]. Students are introduced to 4 different levels of tinkering, which are described in detail, in the following chapters, wherein they experience design thinking, ideation which helps them to develop a new perspective, towards social and community problems. As students progress further in the journey, they are introduced to new technologies, and concepts of computational thinking, and physical computing and other sectoral areas. And finally, they begin working in teams, towards solving real world problems, leveraging their learning from the previous phases. Such a gradual approach, allows the students to acclimatize themselves to this new and innovative experience, learn new technologies, and appreciate the transformation within. The ATL encourages a growth mindset for the young students, diligently helping them graduate through the four levels of tinkering in these labs, detailed in chapter 4.

A video explaining the concept of Tinkering can be downloaded here:
https://www.youtube.com/watch?v=78CcarCgt8Y

Hon'ble Vice President of India Shri M. Venkaiah Naidu at an ATL

[7] Unleashing the Power of an Innovative Mind, Entrepreneur India, 2018

Summary

This chapter introduced the genesis of ATL, with their introduction, objectives and the overall program design while also highlighting the significance of tinkering for India.

The next chapter highlights how schools commence their ATL innovation journey, describing the selection, compliance and subsequent grant-in-aid disbursement process.

Beginning the Atal Tinkering Lab Innovation Journey

The ATL innovation journey commences with the ATL selection process, by the Government of India. AIM has devised a very systematic and rigorous challenge-based application, screening and selection process to select schools where ATL shall be established. The schools shall submit an **online application** to AIM through a website-based portal. Upon selection, schools are required to complete the **documentation and Public Finance Management System (PFMS) compliance** process, wherein they submit the mandatory documents on the document submission online portal, as required by AIM. Upon satisfactory completion of the compliance, the grant-in-aid is disbursed to schools, and they are required to **establish** the ATL as per AIM guidelines and begin their innovation journey.

2.1 Selection Process and Timelines

The selection of schools for ATL comprises of three distinct stages and the entire process takes around 6-8 months to complete.

Stage I: Inviting applications via online application portal: 3- 4 months

Schools are invited to submit online applications for ATL. The ATL online application portal is a seamless platform developed for schools to submit their ATL applications. The online application broadly consists of four sections including contact information of applicant school and principal, basic information related to the identity of the school, performance of school in terms of scores and participation in competitions and other ATL related information such as existence of basic infrastructure and so on.

Applicants are not allowed to make more than one submission each and they must refrain from furnishing false/ inaccurate information in part or in full. Moreover, submission of applications does not, in any way, guarantee selection.

Schools interested in establishing ATL need to submit an application, the guideline for the same can be downloaded here:
http://aim.gov.in/pdf/ATL_Application_Guidelines.pdf

A snapshot of the ATL online form along with the instructions can be downloaded here:
http://aim.gov.in/pdf/ATL_Online_ Application.pdf

Stage 2: Screening of applications: 1-2 months

The selection process for ATL will be in 2 stages- Screening and final evaluation. Received applications would be processed on the basis of eligibility criteria. The eligibility criteria include availability of built up space of 1000 – 1500 sq. ft., minimum enrolment of students, dedicated mathematics and science teachers, basic infrastructure including availability of computers and internet connectivity, steady electricity connection, science lab, library and playground, and regular attendance of staff and students.

Stage 3: Final evaluation: 1 – 2 months

After the screening, selected applications will be evaluated further for final selection, based on weighted average, on parameters, but not limited to district coverage, school participation is in science, technology, arts and creative festivals and awards won, existing mentor and alumni engagement. Data for all the aforementioned parameters are captured in the application form, and it helps us to assess how committed is the school to utilize the ATL as a platform to transform their school into a local innovation hub. After the final evaluation, the list fo the selected schools shall be communicated through the AIM website and via email communication to the selected schools. The schools will be required to complete the compliance process, including documentation related compliance and PFMS related compliance. Both of these steps are detailed in the next section.

2.2 Compliance Process for Atal Tinkering Lab Grant-in-Aid disbursement

Compliance refers to the adherence of AIM under NITI Aayog requirements in terms of proper documentation, such that grant-in-aid can be released to the shortlisted ATL School. AIM has designed a strict compliance process and only those schools which submit the required documents within the stipulated timeframe are selected for AIM grant-in-aid. There are two components of compliance viz. documentary compliance and PFMS compliance. The documentary compliance mandates schools to submit a set of documents, strictly as per the guidelines. Thereafter, the schools also need to complete the PFMS compliance wherein they are required to open ATL specific bank accounts which are subsequently validated and approved on the online portal, as described in the later section.

2.2.1 Documentary Compliance

Shortlisted schools need to upload relevant documents on the online document submission portal for documentary compliance. The documents include a declaration form by the school Principal on the school letter head, Memorandum of Agreement (MoA), bond, which is applicable for non-governmental schools only, bank passbook detail and the ATL lab layout.

2.2.2 PFMS Compliance

In addition to the documentation compliance, the school is simultaneously required to complete the PFMS compliance also. The PFMS is a government-initiated finance management and decision support system, that helps to track and monitor fund disbursement and utilization for government schemes. It is aimed towards maintaining transparency and preventing misutilization of public funds, and has been mandated by the government of India for all schemes.

As part of the PFMS compliance, schools are required to register their institution on the PFMS portal. To facilitate the registration, schools are required to open a new bank account in a scheduled bank exclusively for receiving the ATL Grant. Funds from other sources are not allowed to be deposited in these accounts. Schools must wait for at least a day for the account to be activated on the bank's server/ portal before proceeding to register on the PFMS portal (https:/pfms.nic.in) with the scheme number.

Upon satisfactory completion of the compliance, the grant-in-aid is disbursed to schools, and they are required to establish the ATL, and set up the lab, as per the procurement and grant-in-aid fund utilization guideline.

All the compliance related documents can be downloaded here:
http://aim.gov.in/pdf/ATL_Compliance

2.3 Understanding the procurement and grant-in-aid fund utilization guideline

Each ATL has to procure equipment to make it functional towards the larger goal of creating an innovation ecosystem in our country and building capacities in our youth to become innovators and solution providers. Schools are required to setup ATL, inaugurate and make it operational and working within 3 months after receiving the grant-in-aid money.

The ATL equipment procurement guidelines can be downloaded here:
http://aim.gov.in/pdf/ATL_Equipment_Procurement_Guideline.pdf

It is important to keep the following points in mind during procurement of tools and materials for ATL:

a.   General tools and equipment is accorded priority over task-specific tools.

b.   Important to ensure that at least one person knows how to operate the expensive equipment before purchasing them.

c.   Bulk buying can prove to be economical and can reduce expenses in the long run.

d.   A due diligence is to be carried out by the school to ensure quality of the equipment.

e.   Maintenance and breakage costs must be accounted for, in the operations expenses to cover unforeseen contingencies.

2.4 Understanding Government e-Marketplace for procurement

As per the latest mandate by the Government of India, all procurement must happen via the Government e-Marketplace (GeM). GeM is a platform that provides government departments with an opportunity to procure commonly used goods and services online, while promoting transparency, efficiency and speed in public procurement. The Ministry of Finance, Government of India has authorized and made purchases through GeM (https://gem.gov.in) mandatory by adding Rule 149 in GFR, 2017. All ATL schools must procure equipment through GeM, to ensure transactions with credible vendors to maintain transparency.

Grant-in-aid of ₹20 lakh has been sanctioned for each of the schools for establishing ATL, which includes ₹10 lakh as one time establishment cost and the remaining ₹10 lakh towards operational and maintenance expenses, disbursed in tranches of ₹2.00 lakh per year for five years. Schools receive ₹12 lakh under the ATL grant in the first year, which includes ₹10 lakh for capital expenses and ₹2 lakh for operational and maintenance expenses.

The grant-in-aid fund utilization guidelines can be downloaded here:
http://aim.gov.in/pdf/ATL_Grant_In_Aid_Fund_Utilization_Guideline.pdf

All ATL Schools are required to purchase equipment, as per the ATL Equipment

list which can be downloaded here:

http://aim.gov.in/pdf/ATL_Equipment_List

Hon'ble Union Minister of Human Resources and Development,

Government of India Shri Prakash Javadekar at an ATL launch

Summary

This chapter highlighted how schools commence their ATL innovation journey, describing the selection, compliance and the subsequent grant-in-aid disbursement process.

The next chapter details the strategy for launching and running the ATL, including aspects of establishment and engagement with the students.

Successfully Managing the Atal Tinkering Lab

Once the school has started their ATL innovation journey, they must pay great attention towards designing the ATL space, identifying the right human resources and so on, towards successfully launching the ATL in the school. These elements shall be crucial towards ensuring that the facility is able to meet its expected outcomes.

3.1 Designing the Atal Tinkering Lab space

The ATL shall be set up in a 1000 to 1500 sq. ft. area, depending upon the regional location, as per the ATL application guideline. The ATL space should be one single room with maximum open space, such that one section can be designated for lecturing and mentoring, while another section can simultaneously be used for collaborative project work. In exceptional cases, two adjacent rooms internally connected to each other could also be used. Safe locking and security systems must be installed for the ATL. The ATL should be located in proximity to the main building of the school. The lab must be arranged so that there is enough space for the movement of students. All relevant guideline documents and manual must be placed at a designated place in the tinkering lab.

Since the ATL will be an open experimentation and innovation bed, it is extremely essential to follow the proper design and layout guidelines.

Layout guidelines can be downloaded here:
http://aim.gov.in/pdf/ATL_Design_and_Layout_Guideline.pdf

Additionally, safety is of utmost importance for both students and teachers. Important safety guidelines and etiquettes can be downloaded here:
http://aim.gov.in/pdf/ATL_Safety_Guideline.pdf

Since ATL is an open workspace, conducive to innovation, a vibrant branding scheme should be followed, to allow consistency and uniformity in labs, while also maintaining the unique look and feel of each lab. The branding guidelines can be categorized into three broad categories

ATL Creative branding: The ATL creative branding guideline files can be download here:
http://aim.gov.in/pdf/ATL_Creative_Branding.zip

ATL Design and Layout branding: The ATL design and layout branding guidelines can be downloaded here:
http://aim.gov.in/pdf/ATL_Design_and_Layout_Branding.pdf

ATL showing seating arrangement and equipment placement
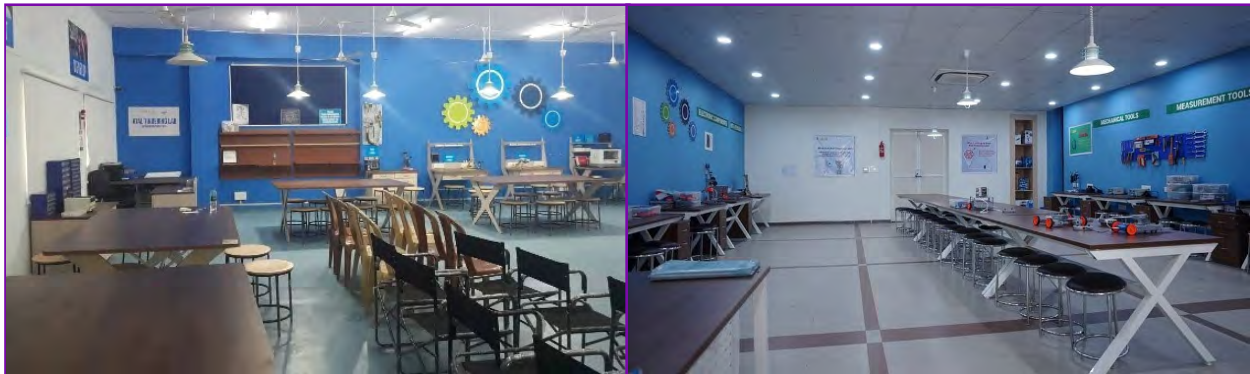
Using AIM branding: The guidelines to use AIM branding can be downloaded here:
http://aim.gov.in/pdf/Guideline_for_using_AIM_Logo.pdf

A video for a model ATL Lab Design and Layout can be downloaded here:
https://www.youtube.com/watch?v=TYKCIPFxGzI&t

ATL lab arrangement, modular furniture, and proper display and storage of tools, and lighting

3.2 Identifying the right human resource

While working in the ATL, students get an opportunity to transform their ideas into workable prototypes/models. However, to achieve the desired results, nominating/selecting teachers with the right knowledge, skills and experience to take the role of an ATL In-charge becomes exigent. The ATL In-charge is crucial towards ensuring the innovation productivity of the ATL and must be selected carefully.

The potential qualifications for an ATL In-charge can be downloaded here:
http://aim.gov.in/pdf/Potential_Qualifications_for_ATL_Incharge.pdf

He/she should be able to nurture the ATL innovation ecosystem to facilitate generation of ideas and keep students motivated towards tinkering. It is the responsibility of the ATL In-charge to set up the ATL, with support from the school management. The ATL In-charge, should organize campaigns in schools to spread awareness and get larger number of students to join the ATL. He/she should motivate students to solve local community problems in the ATL. He/she should identify and develop partnerships with relevant stakeholders - mentors, industry experts and makers and should document all activities and generate reports.

Case study: ATL leadership fostering growth mindset

School: Government Higher Multipurpose Senior Secondary School, Bilaspur, Chhattisgarh

ATL In-charge: Dr. Dhananjay Pandey

"The more challenges we face in life, the stronger we believe we shall be successful in life."

Dr. Dhananjay's first exposure to innovation was at a training program in Raipur at the J R Dani Government school's ATL. He diligently observed and enjoyed the hands-on training sessions along with other teachers and found himself to be a newbie in the field of Internet of Things, 3D printing, robotics. He had never heard of design thinking, problem solving and did not believe that he could learn and experience innovation at this stage in his life.

At first, it was quite challenging for him to motivate students to visit the Tinkering Lab. Most of the students at the government school were from poor socio-economic background, and did not attend school regularly. They were engaged in part time contractual jobs to earn a living for their respective families, and hence would attend school very occasionally. His fellow teachers from other schools, colleges and community advised him to let go of the Tinkering Lab initiative in their school. He was told that innovation wasn't their cup of tea, and ATL had been awarded to them erroneously. However, who knew that these negative remarks only gave more strength to Dr. Dhananjay. He was determined to prove to his fellow colleagues, to Bilaspur, to Chhattisgarh and to the entire country, that government school students from poor socio-economic background, when given an opportunity and when motivated and coached in the right direction, could also be an outlier.

"I live and breathe my tinkering lab. I feel like I belong to this lab, and I am born to mentor students so that they can excel in life."

Today, within a span of 12 months, he has established one of the most promising and outperforming ATLs of the country with the students creating wonderful social innovations and winning prestigious accolades at the national and international stage.

Additionally, an ATL Advisory body (AAB) shall be constituted, that shall monitor the functioning of ATL and ensure alignment with the AIM-ATL guidelines. The body shall be chaired by the Principal of the school, and may comprise of the additional following members: ATL In-charge who shall be the convener, 2 members from local industry/ community/ young innovators/ reputed academia/ alumni and 2 members from parents of school students. The advisory body shall meet at least 2-3 times thrice in a year, to review the progress of ATL in school, make course correction in the implementation plan as and when needed, and identify and develop partnerships with relevant stakeholders, and share their performance report to AIM, as and when needed.

Do's and Don'ts of ATL In-charge can be downloaded here :
http://aim.gov.in/pdf/Dos_and_Donts_for_ATL_incharges.pdf

3.3 Integrating Atal Tinkering Lab with the school curriculum via four levels of tinkering

Once the ATL is set up and human resource identified, the school must draw up a comprehensive action plan for student engagement. This includes devising an ATL timetable and methodology of student enrollment, implementing the four levels of tinkering for the students.

The School Principal and the ATL In-charge must take proactive steps to ensure that the students get enough opportunity to tinker at the ATL. This can be done through a systematic planning of ATL inclusion in the regular curriculum, without compromising on the teaching hours allocated to other subjects. It is important that an ATL schedule is prepared, which helps students from Class 6th-12th to progress through the four levels of tinkering within a specific timeline. AIM has devised these four levels of tinkering, which define the different stages that students would go through, during their innovation journey at the ATL. This will not only create a sustainable ATL student engagement mechanism but will also ensure that the ATL students advance with regard to their technological and innovation skills.

The table below illustrates the four levels of tinkering, the kind of students to be enrolled with their respective objectives and timeline. This plan shall be integrated with the school curriculum, in the form of an ATL schedule in consultation with the school management so that students get enough opportunities to successfully move through the different levels, graduating from students, to tinkerers, to makers and eventually becoming innovators.

Tinkering Level	Students Enrolled	Objective	Session Design	Timeline
Level 1: Pre Tinker	All students from Class 6th-12th	Introduction to tinkering, pre-ideation, idea generation and ATL visits	Six sessions of one hour each, allocate 1-2 periods every week	One month
Level 2: Tinker Club	Open to interested students, teachers can nominate, students supported by mentors, collaborative team work	Introduction to design thinking, digital literacy, computational thinking with Do-It-Yourself activities, make students **Tinkerers**	Two sessions of one hour per week or one session of two hours per week	Two months
Level 3: Tinker Lab	Open to interested and selected student **Tinkerers**, teachers can nominate, students supported by mentors, collaborative team work	Introduction to physical computing and building real time projects, make students **Makers**	Can be determined by the ATL In-charge	Three months
Level 4: Post Tinker Lab	Self-driven students interested in working on real life projects with guidance from mentors, collaborative team work	Encourage motivated students continue to solve real world problems, ATL In-charge and mentors guide, make them **Innovators**	Can be determined by the ATL In-charge	Can be determined by the ATL In-charge

Table 1. ATL Tinkering Plan

Case study: Integration of ATL with school curriculum

School: BEST School, Ahmedabad

ATL In-charge: Mr. Madhish Parikh

Madhish, an alumnus and presently a teacher at BEST School, Ahmedabad saw a huge potential when the ATL was launched in his school, in early 2017. However, the challenge was to integrate the ATL with the school curriculum and the operations. Madhish supported the school management with a few innovative strategies to ensure the ATL was well integrated with the school curriculum and was well perceived by all the teachers.

First, teachers in the school were provided basic training on the ATL resources and means to leverage them, in order to make teachers comfortable with the new age tools. Every class teacher was suggested to start with zero periods, where students were taken to the ATL and ideation activities were conducted. Gradually, interested students started nominating themselves for the ATL.

Second, ATL periods were scheduled in the school time table and the ATL was opened pre and post school hours. The ATL In-charge took advantage of the dual shift structure of the school, by scheduling the tinkering session for morning shift students post school hours and vice-versa. This came as a blessing, as this schedule ensured the ATL was open and operational for the entire school duration.

Third, the ATL In-charge worked with the management to allocate different ATL related responsibilities to various student houses/councils, including ATL scheduling, conducting events and workshops, maintaining discipline and so on.

Gradually, a strong "It's your lab, it's your responsibility" sentiment has been nurtured amongst the ATL students and all these combined efforts have indeed shown glorious results.

After getting selected to the Top 30 innovations of Atal Tinkering Marathon 2017, the two ATL students Vimal and Aditya have further worked on their ideas on smart mobility and founded their own start-up called 'Torque Innovations'. The innovation attracted global recognition, as the students were invited to the Indo-Singapore Innovation Festival – InSpRENEUR 2018, where they presented their innovation to the Hon'ble Prime Minister of Singapore – Mr. Lee Hsien Loong, and the Hon'ble Prime Minister of India, Shri Narendra Modi.

As students progress through the aforementioned levels of tinkering, they are also introduced to concepts of intellectual property, presentation skills and other soft skills considered crucial for creating impact through innovation.

A detailed list of all available modules for the ATL can be downloaded here:
http://aim.gov.in/ATL_Modules.php

A sample ATL schedule is provided below, which can be used by the ATL In-charge to guide students from different classes through the four levels of tinkering. The schedule also includes teacher sessions which can be used to educate the school ATL team on the equipment and efficient management of the ATL. Community sessions refer to sessions for external stakeholders, community students, teachers from other schools in order to create awareness about the ATL objectives and the activities.

Day/Period	1	2	Recess	3	4	5
Mon	Class 6th				Class 12th	
Tue	Teacher Sessions				Class 9th	
Wed	Class 8th			Community Sessions		
Thu					Class 10th	
Fri	Class 7th				Class 11th	

Table 2. Sample ATL schedule

Considering a general school curriculum schedule, the following options could be explored by the ATL In-charge to include the ATL session.

a. **Zero Periods:** Students could be encouraged to use their zero periods for tinkering and engaging with other innovators at their school ATL.

b. **Activity periods or two adjacent periods:** Most schools have activity periods for the students, during which the students are expected to engage in certain social or group-based activity. Students could use this time to organize themselves in groups and identify issues, which they could eventually attempt to solve at the ATL through innovative prototypes. The school principal is encouraged to allocate two adjacent periods for the ATL, as ATL activities could be time consuming. This could also help students to plan their tinkering activity, so that it is completed in one session.

c. **Post school hours and weekends:** ATL should also be accessible to students after school hours and on weekends, to work on their innovations. Moreover, this would also provide an opportunity to other students from the community to get exposed to the ATL.

A video on integrating the ATL with the school curriculum can be downloaded here:
https://www.youtube.com/watch?v=S4LPWrH1dHA&t

Case study: Enrolling and engaging the ATL students

School: DPS Srinagar, Srinagar, Jammu and Kashmir

ATL In-charge: Mr. Ehsan Qudussi

The ATL in Delhi Public School Srinagar has seen its share of difficulties due to its hostile location. The ATL journey started with rebuilding of the school premises and constructing the ATL space. In fact, the school was unable to find a suitable vendor/service provider for procurement of ATL equipment, as per AIM guidelines.

Need is the mother of invention. This is when three students of the school viz. Muazzam, Haider and Abrar decided to take matters in their own hands. They studied the ATL resources with Mr. Ehsan and procured all the material necessary for the ATL. This deep dive enabled them to gradually transform into 'ATL experts' of Jammu and Kashmir, as they conceptualized a two-day state level innovation workshop in their school ATL, with the help of the ATL In-charge. The students also developed several websites for their school, one of which is for 'Techknow' – the largest technological event organized for schools in Jammu and Kashmir in 2018. (Link: http://techknow.dpssrinagar.com/). This spirit exhibited by the ATL students is an inspiration for all of us, and they proved that passion and commitment can overpower all obstacles.

3.4 Engaging the nearby community and non-Atal Tinkering Lab schools

The community plays an important role in the successful implementation of the ATL as the local hub of innovation. Parents, students from the community, non-government organizations (NGOs), volunteers, government bodies can make significant contribution towards providing support and creating awareness about the ATL innovation activities. Combined efforts would determine how the ATL is able to reach its true potential and a few recommendations include the following:

a. **Orientation sessions for parents and students outside ATL school:** The orientation sessions could be extended to the parents, as they are important stakeholders in nurturing the innovation mindset of the students by providing them with the support needed. Further, students from the community could also be involved in these sessions to expose them to tinkering, while increasing the reach of ATL in the student community.

Case study: ATL Community Engagement

School: Hongirana School of Excellence, Shimoga, Shivamogga, Karnataka

ATL In-charge: Rohith V.

"Every school has its challenges and we need to work around them to create maximum impact",
says Rohith V., ATL In-charge.

One of the first schools selected for establishing ATL, the Hongirana School of Excellence has created immense impact in the Shivamogga and nearby districts of Karnataka.

The unique concept of 'Tinker Tour' initiated by the school, is essentially an attempt by the students to take tinkering to every school. In pursuit of 'enabling each student to tinker and innovate', a two-day tour including ATL teachers and student-experts from class 11th and 12th was conducted. The 'Tinker Tour' bus used is equipped with ideation and tinkering workshop material for students to work on their prototypes, while on-the-go. The tour was conducted in five rural government schools of the region in two hours' sessions, during which students of the school were introduced to the concepts of tinkering and innovation with hands-on activities.

The school ATL also organized the 'Vijnanotsava 2018' – the mega Tinker fest, during which ten different workshops and events were carried out simultaneously in the ATL on December 1st, 2018. Fifty-five teachers from 25 different schools across the community came together to make the event a huge success. For each workshop, experts were invited to conduct sessions on topics such as 3D printing, robotics, drones and so on. To share inspiring stories, start-up entrepreneurs and scientists from Defence Research and Development Organization were also invited, with the event witnessing a total of over 1300 attendees.

The ATL at Hongirana School of Excellence has clearly stood out in its efforts to create an innovative ecosystem in the community, despite persisting challenges which the ATL In-charge seems determined to overcome.

b. **Collaboration with local NGOs, community centers, volunteers to reach out to the extended community:** The ATL In-charge could collaborate with local NGOs and other support groups to take the ATL message further in the community. This will not only help to increase awareness, but also involve more students from the community in ATL activities.

Case study: Enrolling and engaging the ATL students

School: Andhra Pradesh Rural Welfare Society Girls School, Vijayawada District, Andhra Pradesh

AATL In-charge: U. Vinay Babu Ulli

Happiness witnessed no bounds when a rural school 60 kilometres away from the nearest town in Andhra Pradesh was selected to establish an ATL, back in 2017.

The students of the Andhra Pradesh Rural Welfare Society Girls School had never seen a computer before the establishment of ATL. The students were hesitant when it came to communicating their thoughts with the outside world. To enable the students to speak up and share ideas, the school created the 'Ideabox'.

The Ideabox - where students can contribute with their ideas without any fear or hesitation, provided students the 'anonymity' while also giving the liberty to write and share ideas. Just like the butterfly effect, the use of the Ideabox grew exponentially. The Ideabox was opened after a month and the top 10 ideas were announced during the morning assembly. The students were asked to express their opinion on the ideas by a show of hands and with each hand rising, the confidence of those ten students only grew stronger. Thereafter, their names were called out which indeed gave a great boost to their self-belief.

Out of the top ten selected ideas, the local community issues were selected and solved one by one, by creating prototypes and on-ground testing. The students got a chance to present their ideas at the Maker Faire in Hyderabad early in 2018 which transformed to a special invitation to the World Maker Faire, 2018 at the Bay Area, California, USA – considered the 'Mecca' for a Maker!

"10 students from a rural school in India invited to the Biggest International event to celebrate the making and tinkering culture", isn't that an inspiring story? 😊

c. **Seeking assistance from local government bodies to identify meritorious students:** Local government bodies can help the ATL school to identify meritorious students of the community with proven innovation potential, who could be involved in the ATL activities. A special timetable to accommodate such students and other students from the community could also be designed.

3.5 Leveraging content and resources from AIM, NITI Aayog website

AIM under NITI Aayog provides a rich repository of content and resources on its website, for ATL schools to learn from and successfully implement the initiative. The content includes videos, documents, and other handholding materials significant for the ATL In-charge to conduct the ATL activities, in accordance with the AIM guidelines. While conveying information more effectively and providing information related to ATL in a concise manner, the online resources are easy to understand and are deployed with the intent to help ATL get answers to most of the queries pertaining to setting up the labs. Given that ATL schools are spread across the length and breadth of India, all ATL related content shall be published in English and other official/local languages for a higher reach and more awareness.

3.6 Managing an Atal Tinkering Lab

Proper administration and management of the ATL is necessary to ensure its smooth functioning. AIM has established guidelines for schools with regard to inventory and information management, which are further detailed below.

3.6.1 Inventory Management

A significant component that ensures seamless operation of ATL is keeping a tab on items such as tools and materials, content, furniture and so on. The ATL In-charge, responsible for general inventory and security of equipment/ consumables, is also entrusted with the task of supervising students to ensure careful handling of equipment to minimize chances of damage.

The following activities are proposed to ensure a systematic inventory management of the ATL:

a. **Maintaining an inventory document** – A list of all equipment in the lab on paper and in online mode is to be maintained.

b. **Maintaining records of all supplies and consumption of equipment**– Detailed records of all consumed materials, supplies and obsolete stock is to be maintained and duly countersigned by the Principal/ Vice-Principal, along with the ATL In-charge. Dedicated forms/ templates for safety, replenishment, and excess outdated stock shall also be maintained.

c. **Determining frequency of ordering stocks**– It is recommended to set a minimum stock level, so that supplies are ordered for, well in advance.

d. **Procurement formalities**– The ATL In-charge must initiate the procurement process and submit approval request to AAB, before the complete depletion of stock.

e. **Maintaining a record of bills/ expenses**– ATL budget should be maintained considering both fixed and variable expenses, with complete record of bills to facilitate the ATL audit, as and when conducted.

f. **Maintaining the safety and security of the lab**– Safety and security while working in the ATL is extremely important, and the school management must implement all relevant guidelines to ensure safe working conditions.

3.6.2 Information Management

All activities in the lab need to be properly recorded, documented and relevant information must be shared with relevant stakeholders to ensure success of the initiative.

a. **Information sharing with internal purposes/audience**

ATL internal audience comprises of students, parents/ guardian, teachers, board of trustees and school management. It is vital to keep them apprised of all necessary information, since they may be holding decision-making positions and capable of providing required support for smooth operation of the labs.

b. **Information sharing with external purposes/audience**

The ATL external audience are AIM team, ATL Management, community schools making use of the ATL facilities, other ATL schools, the maker community, and potential partners/ stakeholders and so on. Information ought to be disseminated to these audiences for their support, as and when required.

A video on Managing the ATL can be downloaded here:
https://www.youtube.com/watch?v=K4qkCe6TAjo

## Summary

This chapter highlighted how the ATL-in-charge, along with the school management, shall lead the tinkering initiatives at the ATL, while also focussing on the various aspects of systematic management of the ATL.

Chapter 4 illustrates the various activities and events the ATL could organize, to foster innovation amongst the students.

Building a Vibrant
Atal Tinkering Lab Ecosystem
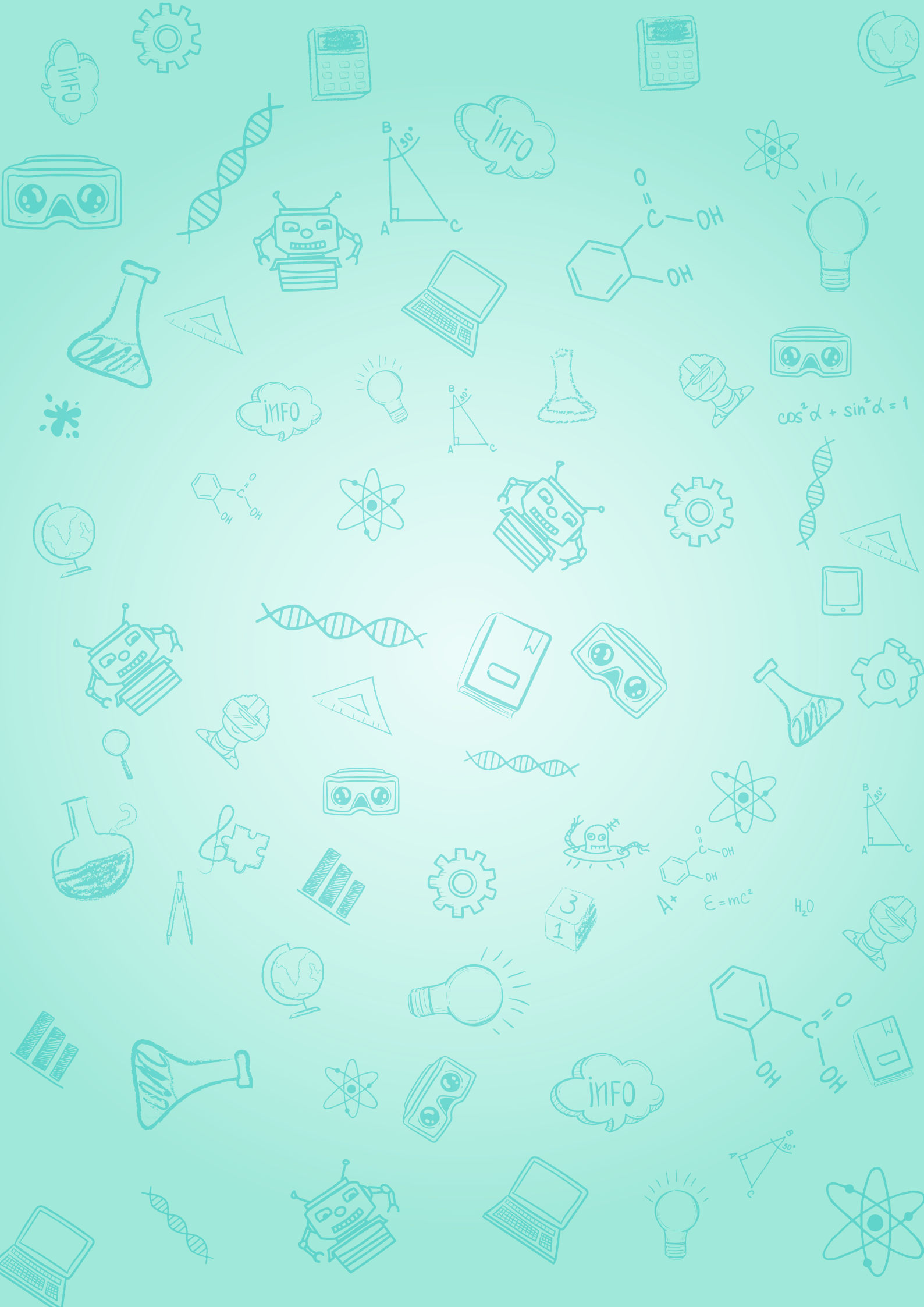
It is important that the ATL organizes and participates in tinkering activities, for the benefit of the students. These activities do not only provide the ATL students with an opportunity to tinker and showcase their innovations, but also help to create awareness in the community, while engaging with parents and other students from non-ATL schools, making the ATL a community hub of innovation[8]. The conducive environment created by such intra school tinkering and innovation activities also prepares the students to go out and advocate their innovations on external platforms, which also provides them the recognition they deserve for their work. In this chapter, a few nationwide events conceptualized by AIM and organized by ATL schools have been discussed, along with a strategy to continuously communicate with the ATL schools. However, these concepts are only indicative in nature and the schools can conceptualize and implement more of such initiatives for a successful implementation of the Program. Moreover, the schools shall have the liberty to customize the different concepts and organize the activities, while making sufficient efforts towards publicity so as to maximize community participation.

4.1 Atal Tinkering Lab Community Day

ATL Community Day is a special event where young minds from the community come together and celebrate tinkering, learning and innovation. This is a day to celebrate inclusiveness in the community through innovation, an opportunity for everyone to come together and solve problems using the ATL infrastructure.

Celebrated on April 14th on the occasion of Ambedkar Jayanti throughout the country, ATL school students and teachers organize a full day of tinkering activities for non-ATL and community children, especially those who have not been sensitized about the ATL and/or did not yet have an opportunity to tinker at these labs.

The Community Day 2018 was a huge success when AIM under NITI Aayog held aloft Babasaheb's legacy by involving over 380 ATL schools, 45,000 ATL students and more than 3600 community children and encouraging them to share creative/ innovative ideas with their teachers, mentors and also with their mates. NGOs were roped in to mobilize non-ATL students/ community children. A series of sessions during the day to introduce these children to the world of tinkering and innovation were conducted by the ATL In-charge/ trained teachers/ ATL mentors and students. Some activities that enthused the participating students were paper circuits, upcycling activity, newspaper bridge activity and so on. The schools were allowed to utilize ₹ 5,000 from the ATL grant to organize the event.

[8] Atal Tinkering Lab (ATL): An opportunity to experience innovation in school, NITI Aayog, 2018

4.2 Atal Tinkering Lab School of the Month Challenge

The recent School of the Month (SOM) challenge organized by AIM was themed on 3D printing and required students to leverage the 3D printing facility in their school ATL, to innovate in one of focus areas proposed by AIM. The winning schools got recognized for their outstanding innovations and the students were awarded with prizes sponsored by AIM partners – Stratasys and KPIT. ATL SOM Challenge is an opportunity for ATL schools to utilize the different resources and modules provided by AIM to propose innovative solutions to theme based problem statements. The challenge follows the learn-by-doing philosophy, and the competitive spirit helps to bring out the best from each of them. is a competition where ATL schools go head-to-head, with the aim to create the best innovation prototype using the theme of the challenge. The schools which successfully complete the challenge are felicitated and featured on the official AIM website and Social Media handles. SOM winners are also eligible for exciting prizes from AIM's partner organisations.

> The recent SOM challenge organized by AIM was themed on 3D printing and required students to leverage the 3D printing facility in their school ATL, to innovate in one of focus areas proposed by AIM. The winning schools got recognized for their outstanding innovations and the students were awarded with prizes sponsored by AIM partners – Stratasys and KPIT.

4.3 Atal Tinkering Lab Tinkering Festival

Tinkering in schools is now becoming a nationwide movement and the Atal Tinkering Festival allows children to unleash the entrepreneur within during their summer vacation. Students are encouraged to keep their boredom aside this summer break, and prove it to their family and to the world, that they can become a Student-preneur or a Student-maker while being at home. A wide range of skills nurturing entrepreneurship, creativity and innovation are inculcated during the festival, benefitting the ATL students in their pursuit for excellence.

> The details for organizing the ATL Tinkering Festival can be downloaded here:
> http://aim.gov.in/pdf/ATL_Tinkering_Festival.pdf

The ATL Tinkering Festival organized by AIM under NITI Aayog is a series of activities for students across the country, to showcase their creativity during the final exhibition at the 48 hour Tinker Fest. The tinkering festival is conducted in 2 phases viz. Phase 1- Student Exploration at Home or outside ATL and Phase 2- 48 Hour TINKERFEST at ATL. All ATL schools selected across India are required to conduct Tinker Fest.

4.4 Atal Tinkering Lab Tinkering and Innovation Marathon

The ATL Marathon is a nationwide challenge revolving around the areas of national importance viz. clean energy, water resources, waste management, healthcare, smart mobility and agri-tech. The Marathon is an uplifting opportunity for young innovators, not only to showcase, but also to take their idea to prototype and further to a minimum viable product via the opportunities given to the Marathon Winners. The schools are expected to submit working proof of concepts or prototypes of the innovation solving a problem statement, as part of their final submission. The selected innovations are further refined with prototyping support facilitated by the school in the ATL lab.

During 2017, over 650 innovation entries were received in the marathon. The top 30 winning innovations represented 20 different states and Union Territories ofIndia. These 30 innovations found place in a compendium launched by Dr. Rajiv Kumar, Vice Chairman, NITI Aayog. (Booklet link: http://aim.gov.in/pdf/top30final-low.pdf).

To further boost the morale of the winners and bring them to the forefront, a few of them were made to interact with the Hon'ble Prime Minister on June 4th, 2018 over video conferencing. The Top 30 teams were awarded with prizes and accolades. The goal was to successfully convert their innovations into products, for which the winners were inducted into the Student Innovator Program, a program in which the innovators worked under the mentorship of AIM's incubators, eventually creating a market-ready product. The ATL Tinkering Marathon including application stage, evaluations, announcement of top innovations and the concluding student innovator program has a total duration of 11 months.

Case study: Participating in national innovation challenges

School: Paljor Namgyal Girls Senior Secondary School, Sikkim

ATL In-charge: Mr. Ivan Lepcha

Coming from one of the remote centres of the country, the ATL at PNG Sikkim was the first of its kind innovation led initiative and since its inception, has successfully transformed into an epitome of exciting opportunities.

The School Management encourages the ATL students to participate in various AIM and other external events, having created a vibrant ecosystem wherein teachers and students work together as a cohesive team determined to create impact through their commitment and strong will.

The students, enthused by the support received by the School Principal and the management, have participated in several external events including Nobel Prize Series 2018, Goa, Bengaluru Tech Summit 2018, Bengaluru, Mini Maker Faire 2018, Bengaluru amongst others. Their prototypes received great commendation at the India International Science Fair (IISF) 2018, Lucknow organized by the Department of Science and Technology, Government of India and the Vibrant Gujarat Start-up and Technology Summit, 2018. With their strong inclination towards creating value through innovation, the ATL innovators of the school figured among the Top 100 teams of the ATL Tinkering Marathon 2017 and Top 5 ATL teams of IISF 2018.

Case study: Representing India at an International Innovation Challenge

School: Choice School, Kochi, Kerala

ATL In-charge: Mr. Sunil Paul

Choice School has been consistently ranked as one of the best schools in Kerala. The school is famous for its sports and cultural achievements at the National level. The ATL In-charge strongly believes the ATL established in the school has greatly helped the school in its overall performance in science and technology. Interested students from not only class 6th to 12th, but also from classes 3rd to 5th have one period for ATL activity, every week. Those who want to spend extra time at the labs are welcomed and students participating in competitions usually stay back after school time.

The ATL students started participating in competitions organised by the colleges in Kochi and then, gradually moved to national and international competitions. Fourteen students from the school ATL participated and won third prize in the Entrepreneurial challenge at RoboRAVE India, 2017. One of the school teams got sponsorship from Sony Global Education to participate in RoboRAVE Asia in Beijing, China. Jordan Joby Eralil and Basil Alias, the ATL students of class 6th represented India in the Sony "KOOV Robot" challenge at the competition and won bronze medal in both individual and group robot building competition.

When we were invited to compete in RoboRAVE International 2018 in Albuquerque, New Mexico, we were thrilled. Going to an international robotics competition was a prized rare opportunity and we had hoped that even if we did not win, we would get the right kind of exposure to motivate us to try again. We spent our entire vacation in the school ATL to design and build the project. I am very happy that I got the opportunity to represent India, with our national flag during the inauguration ceremony of RoboRAVE International" said Naina, a member of the nine members' team.

"I was part of the first RoboRAVE India competition conducted in our school when I was in class 5th and my team won the first prize in firefighting competition. From then onwards, I developed a liking towards it and our ATL teachers encouraged me immensely. I was lucky to be selected for the RoboRAVE International competition which was held at New Mexico. It was a great experience, exposure, and fun which only very few could dream off. I got this opportunity only because of the ATL of my school and I spend most of my break time in the lab for tinkering." said Saif, a grade seven student, who handled the programming part for the Solar Powered Sewage Cleaner.

Additionally, 22 students from the school also participated in Shaastra 2018, annual technical festival of IIT Madras, and won the first and second prize in Robo-oceana, one of the flagship robotics competitions at the event.

The Choice School team at RoboRAVE Asia competition, Beijing. We won Bronze medal in two robot building challenges using Sony's 'KOOV' robot platform

4.5 Unbox Tinkering – Teacher Training Program

To build capacities of resources associated with ATL, AIM under NITI Aayog along with its partners, conducted the Teachers Training Program across the country. The teachers received training on various aspects of establishing, running and successfully monitoring an ATL.

Till date, more than 1500 teachers have been trained by various partners including Intel, IBM, KPIT, Learning Links Foundation, and others.

4.6 Continuous communication with Atal Tinkering Lab

One of the many crucial parameters that plays a vital role in making a program successful, impactful and effective is the communication between its internal and external stakeholders. This free flow of information not only eliminates ambiguity but also keeps stakeholders involved and informed about the developments of the program. Several channels must be established to communicate with the ATL such as:

a.   **Helpdesk Email**

An official email id must be set up for information sharing, and issuing clarification of any kind with respect to the program.

b.   **Social Media**

Social media is a good platform to reach out to existing and potential stakeholders, not just to display the achievements but also to ignite the spirit of innovation in the wider group. Schools are encouraged to share stories on social media channels, to create awareness about the innovation activities and invite community participation.

AIM has optimally leveraged the collaborative power and wider reach of social media platforms like Facebook and Twitter to drive and foster innovation.

AIM's FB Page: www.facebook.com/AIMtoInnovate

AIM encourages all ATL schools to create a Facebook page for their ATL and share various ATL activities on the forum. Schools are advised to tag 'Atal Innovation Mission' and 'NITI Aayog' in all their posts and use the hashtag - #AIMtoInnovate.

AIM's Twitter Handle: @AIMtoInnovate

c. **Messenger groups**

Messenger groups such as Whatsapp, Facebook and other social media platforms facilitate swift resolution of issues, information sharing, status update, sharing of achievements/ accolades and other handholding support.

> A tutorial video for creating a Facebook page can be downloaded here:
> https://www.youtube.com/watch?v=LDnSbsCpkNE

Regional and state-wise Whatsapp groups have been created by AIM and these have been found to be very useful.

Principal Scientific Advisor to the Government of India, Prof. K. VijayRaghavan inspiring students to connect science and technology with innovation

Summary

This chapter discussed the various tinkering and innovation related events and activities that could be conducted by ATL, along with illustrative events organized by AIM.

The next chapter discusses the significance of mentoring in fuelling the success of the ATL initiative and how different stakeholders including professionals, alumni and corporates could contribute towards the same.

Mentoring for Success of Atal Tinkering Lab

An important aspect of successful implementation of ATL is the robust partnerships forged with different stakeholders including mentors, industry professionals and alumni, in order to leverage their expertise towards guiding students on various innovation related skills. Sustainable institutional frameworks that draw upon the capacity, resources, technical know-how of different partners are key to ensure the success of the Program. Moreover, since tinkering as a concept is still new in our country, to advance the idea requires sustained handholding support from mentors from corporate world, academia, institutes of higher education, government and so on. Given that ATL is non-prescriptive by nature; mentors are expected to be enablers rather than instructors[9]. Technical knowhow, innovation and design, business and entrepreneurship are some of the areas of contribution from the mentors. Partners could also help expand the technical horizon of the students by providing internship opportunities and organizing other programs, especially tailored for the ATL students.

[9] Redefining School Education With Tinkering And Innovation, BusinessWorld, 2018

To maximize the impact of the ATL, AIM, NITI Aayog launched the MoC program. Envisaged to be the largest formal volunteer mentor network in India, MoC is aimed at engaging leaders who can guide and mentor students in these labs. The concept takes inspiration from India's proven track record of being a volunteering nation where national level volunteering programs like Teach for India have become a huge success. Since its inception, this strategic nation building initiative has garnered strong support, with several ATL schools already adopted by corporates and institutions across India, for end-to-end mentoring support. Reassuringly, corporate organizations are supporting tinkering efforts in smaller cities and town. For example, one tech giant has agreed to support all ATL schools in Bhubaneswar, Bhagalpur, Gaya, Jogindernagar, Golaghat and several other such Tier 3 and Tier 4 towns.

Furthermore, the All India Council for Technical Education will facilitate ATL schools' access to mentors through its own network. In addition to corporates, the MoC is also a call to professionals, academics, and students in their individual capacity to join AIM, NITI Aayog in preparing our next generation for a world of continuous innovation and with regard to different skills sets including and not limited to ideation, design-thinking, making and so on. A modest but important ongoing commitment of 1 – 2 hour per week is expected from the mentors. More than 40 of India's top thought leaders have signed up as Super Mentors for this initiative – effectively, one hopes, mentoring the mentors and serving as Brand Ambassadors – and the list is growing every day.

Super Mentor Session with Ms. Debjani Ghosh, President, NASSCOM

After going through a rigorous application and selection process, a mentor is assigned a school and is expected to spend a few hours weekly/ monthly, exposing the young student innovators towards innovation and encouraging them further to pursue entrepreneurship. However, it was observed that since most of the mentors were concentrated in the metropolitan hubs and travelling to the ATL schools located across the country was an impediment, the MoC program recently opened the opportunity for online mentoring. As on date, more than 2,500 mentors are devoting their services towards mentoring young innovators with immense self-drive, passion and commitment. Also, as per latest records, the MoCs have conducted more than 1,800 sessions with over 6,000 hours of mentoring, over the past few months.

Recognizing the need to enthuse and engage with the MoC network, a vibrant social media-based community has been developed for sharing mentoring stories, encouraging innovation-based collaboration and query resolution. Mentoring stories from our MoCs are being regularly featured on AIM, NITI Aayog's social media handles, to increase awareness and encourage mentors to do more. A robust Mentoring Portal, ATL InnoNet, for taking tutorials, recording sessions, participating in technical discussions with a low turnaround query resolution system is diligently helping with mentor on-boarding and activation. Also, a Monthly Mentoring Theme has been launched for mentors to work with ATL students, while also involving the community to push the narrative of ATL becoming a hub of innovation. Recently, MoC Meets were organized in cities across the country covering eight states to learn about their issues, receive feedback, provide clarifications and create a strong sentiment towards the program. As consistently observed, these Meets commence as an issue-sharing platform and over a period of two hours, gradually transform into a collective solution finding opportunity, with mentors trying hard to solve issues being raised. All such measures are collectively fuelling the success of this program, which is gradually taking the shape of a national movement.

There has indeed been a major transformation in the way the ATL students perceive innovation, thanks to the efforts of the Mentors. The MoCs, including some very distinguished and popular professionals of the country who have made a mark in the entrepreneurial ecosystem of the country, called as AIM, NITI Aayog's Super Mentors, have been religiously visiting schools and working with students on their projects with a strong sentiment of nation building. They are not only helping students, but also consulting the ATL-in-charge on good practices to improve innovation productivity, gradually become responsible and vocal stakeholders in this innovation ecosystem. Through the successful implementation of this program and the response received, it is realized that there always existed a zeal to contribute, but a well-organized opportunity that provides the respect, responsibility and empowerment to create impact on ground was all that was required, which the program precisely facilitated.

As mentors, alumni could be real contributors towards making the school ATL a hub of innovation, by enhancing the thought process of students.

Case study: Sustainable Partner Networks – Working with the Alumni

School: ATL Government School Cluster, Chandigarh

The ATL Alumni are extremely important partners in ensuring the success of the ATL. This is proved by four ex-ATL innovators, who studied at different Government schools in Chandigarh, and have thereafter, come together to create an inclusive ATL community in their city.

All these ATL alumni, now studying in different engineering colleges, have collaborated with other second year engineering students of Punjab Engineering College (PEC) and College of Engineering and Technology (CCET) to create a pool of ATL mentors. Twelve of these students are now being mentored by CCET Electronics Department Head of Department Dr. Sunil Kumar Singh, who has taken the onus of training them to become expert mentors for the ATL.

All these ATL mentors have divided themselves into three groups viz. aerospace, 3 D printing and robotics and are now working with five ATL schools of their community including Government School Sector 16, Government School sector 19, Government School sector 37, Government School Dadu Majra, and Ryan International School, Chandigarh.

These young mentors have created a sustainable calendar wherein, every Saturday, they visit ATL schools for three hours' sessions on various technologies, and each school gets three Saturday sessions per month, one on each of the abovementioned areas.
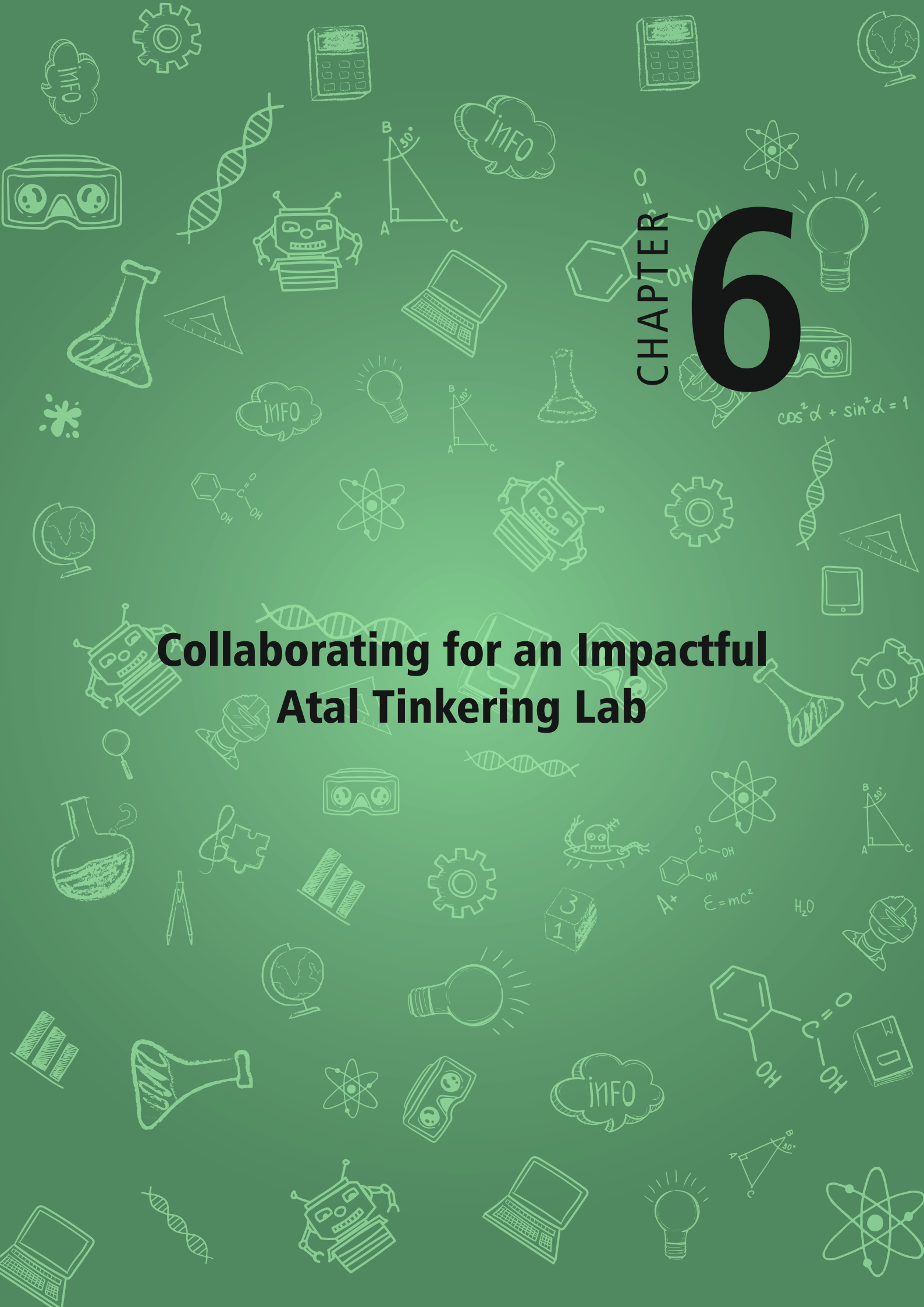

Summary

This chapter discussed how mentoring is significant for the success of the ATL. The next chapter underlines the role institutions could play, to further enhance the outcome of the ATL initiative.
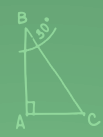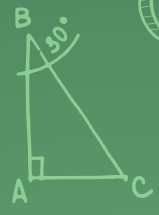
Collaborating for an Impactful Atal Tinkering Lab

The successful implementation of the ATL initiative shall require several institutional partners to come together to build an ecosystem of innovation and learning, such that the partner institutions together provide the right mix of support structures. Creating a positive sentiment in the community towards the initiative is a crucial element to create impact.

Institutions could act as major contributors towards helping the ATL establish itself as the community hub of innovation. Institutions can support the ATL through mentoring and creating awareness about the innovation initiatives being taken at the ATL. Corporate organizations may include start-ups, Micro, Small and Medium Enterprises (MSMEs) and large corporates, that may provide ATL students with exposure to advanced technologies. Also, with entrepreneurship taking a massive leap ahead due to the efforts undertaken by AIM, successful start-up founders have great stories to share with and educate the young ATL innovators, as mentors. Additionally, local and regional makerspaces could also provide extensive support to ATL students through workshops and training sessions.

Further, academic institutions such as engineering colleges, polytechnics, ITIs and other educational institutions could help students quickly imbibe the concepts of tinkering, making while helping them accelerate their learning curve. Institutions of higher learning such as the Indian Institute of Science (IISc), Indian Institute of Technology (IITs), Indian Institute of Management (IIMs) including other prestigious organizations could also contribute by conducting mentoring through their skilled faculty members and research teams. This shall shape a robust innovation value chain, wherein ecosystem stakeholders placed further could handhold those in the pipeline, creating a sustainable Indian innovation ecosystem.

Several of these institutions shall have a significant role to play towards shaping a productive ATL journey for the students.

Beyond the support that could be provided by external stakeholders as described above, a few schools might need additional handholding. This is where institutional partners could make a major contribution through ATL adoption, especially in the case of government schools or schools located in second/third tier cities and rural areas, with lower access to improved infrastructure which could affect the quality of implementation of the ATL initiative. AIM has established clear guidelines for ATL adoption, which could be implemented by any organization intending to make this meaningful contribution.

The primary responsibility of partners adopting ATL schools shall include:

- Assigning a Resource Person (RP) to manage ATL related activities in school, support the ATL In-charge and ensure successful implementation of the ATL initiative in the school. The RPs should facilitate teacher training

programs, student workshops and boot-camps, in partnership with the ATL In-charge. They should also conduct community outreach sessions to increase awareness about the ATL.

- Providing a continuous pool of volunteers who would take mentoring sessions for ATL students and teachers, which will eventually lead to creation of technology innovations.

The secondary responsibility of partners shall include:

- Conducting events/competitions/exhibitions for their adopted ATL while encouraging ATL students to participate in various innovation events/ competitions, challenges.

- Supporting ATL schools to increase their social media presence

- Organising workshops: Workshops on different themes for ATL students could be organized, for students to better understand innovation.

- Mentoring: Partners could conduct mentoring programs during which experienced professionals could spend time with the young innovators, helping and advising them on furthering their innovative ideas.

- Training sessions: Partners could organize the Teachers Training Program in different ATL schools, to educate the ATL-in-charges on the ATL mission and impart hands-on learning on the different equipment that the lab shall house.

However, the support that partners could provide is not just limited to non-financial aspects, as they could also provide financial aid for the scale-up, capital and other operational expenses related to the ATL.

Corporate Social Responsibility (CSR)[10] provides a good avenue through which corporates could provide support to ATL, while making a significant contribution towards nation building.

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[10] What is CSR?, United Nations Industrial Development Organization

Several corporate partners support AIM under NITI Aayog in running ATL. AIM's partners including Intel, IBM, DELL, Learning Links Foundation, FICE, KPIT, Microsoft, Network Capital, SAP, Stratasys, tGELF, AICTE, Workbench projects, Maker's asylum, T-Works, Encube Labs, The Better India and several others have demonstrated their support and commitment towards strengthening the ATL ecosystem and making it a successful nationwide intervention. They have together adopted hundreds of ATLs, across the length and breadth of India, and are actively supporting the ATL mission. They strengthen the ATL ecosystem by who collaboratively extend support in the following areas:

1. Organising workshops: Workshops on different themes for ATL students are frequently organized by AIM's corporate partners, which help students better understand innovation.

2. Mentor programs: Partners conduct mentoring programs during which experienced professionals spend time with the young innovators, helping and advising them on furthering their innovative ideas.

3. Training sessions: AIM's partners organize the Teachers' Training Program in different ATL schools, to educate the ATL-in-charges on the ATL mission and impart hands-on learning on the different equipment that the lab houses.

4. Setting up ATL in some schools: Several partners have recently partnered with AIM to help set up ATL in schools. They work with the School principal and the ATL-in-charge on the action plan, student enrollment, financial management and so on to expedite the ATL innovation journey.

5. Providing human resource: A few AIM partners also provide trained, dedicated human resource to ATL, helping the school in creating a good innovation ecosystem.

AIM works closely with all its partners to ensure they work in cohesion such that the ATL essence is preserved, while maintaining homogeneity in the outcomes desired to be achieved.

Collaborating for an Impactful
Atal Tinkering Lab

Mr. Amitabh Kant, CEO, NITI Aayog appreciating efforts of all ATL partners and mentors

Summary

This chapter discussed the significance of institutional collaborations in helping the ATL and the engaging students reach their true potential, through various support mechanisms.
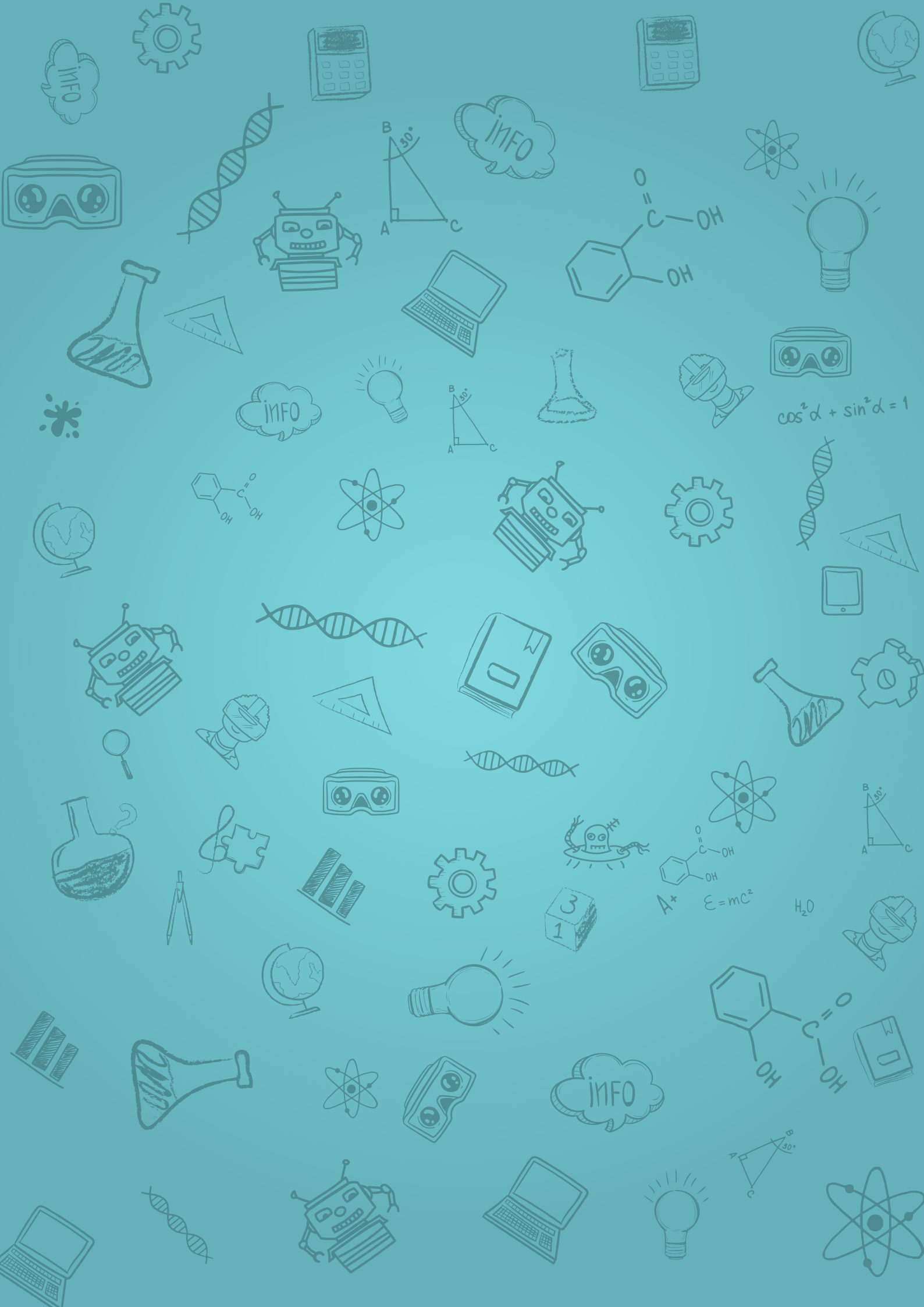
The next chapter illustrates the monitoring framework to measure the impact of ATL and to ensure that efforts are being made in the right direction.

Measuring Success of an Atal Tinkering Lab
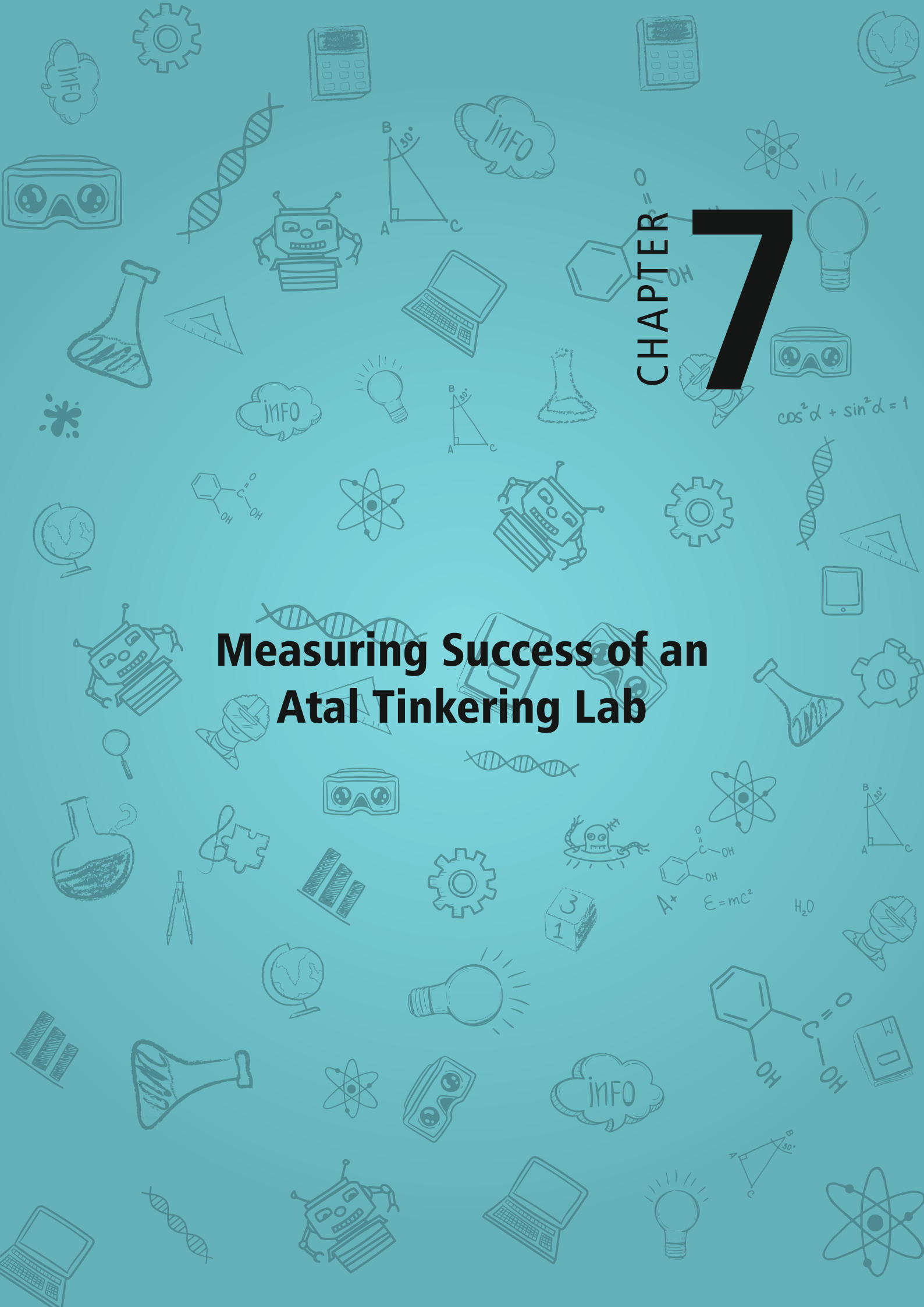
Good governance and regular monitoring are of paramount importance and form essential components of project management and successful implementation of any new initiative. Hence, regular monitoring and assessment shall be two-fold: first, with regard to how the ATL facility is serving as an innovation platform for the students and community, and second, with regard to the impact created at the student level in terms of skills developed.

7.1 Monitoring dashboard

The performance of the ATL shall be assessed based on certain parameters, which may be submitted through a monthly/ quarterly report. The success of an ATL is measured based on both subjective and objective parameters such as number of students engaged in the ATL, number of ATL workshops conducted, number of mentoring sessions organized, number of teachers trained, number of innovation projects initiated, number of innovations taken to community, number of patents and copyrights filed (if any) and so on. The monitoring report shall also include details on financial expense. It is advised that the ATL In-charge must keep an invoice/bill of all the incurred expenses, for their record, and subsequent submission to AIM.

7.2 Impact created

Adopting an outcome-based approach[11] is important for any programmatic intervention to create a substantial impact on ground. Since ATL is a national initiative, it is necessary that the overall outcomes are continuously monitored and corrective measures taken as and when needed. The success measure would include inputs, outputs, outcomes and overall impact created. The inputs for the ATL intervention that provide impetus towards achieving the objectives of the ATL mission may include number of students, teachers and mentors engaged, number of training programs conducted on different elements of innovation and Intellectual Property (IP) creation and number of innovation events conducted.

The outputs include quantitative measures in terms of number of innovations created in the ATL. The ATL outcomes shall be assessed through the impact they create in the overall problem solving, innovative mindset of the youth of our country leading to large scale entrepreneurial initiatives enabling accelerated economic and social progress of the country. The outcome can be assessed based on how ATL helps students inculcate various 21st century skills including creativity and innovation, IP creation, Entrepreneurial Mindset, Critical Thinking and Problem-Solving Skills, Communication capability, Collaboration Skills, Flexibility and Adaptability, Initiative and Self-Motivation, Social and Cross-Cultural Skills, Productivity and Accountability, Ethical Leadership, Integrity and Responsibility, Altruistic and Societal Thinking, Self Confidence and Holistic Thinking, and so on.

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[11] Moving from Outputs to Outcomes: Practical Advice from Governments Around the World, Managing for Performance and Results Series, Online Resources, World Bank

Measuring Success of an Atal Tinkering Lab

The ATL is the first step in a chain of linked innovation initiatives that AIM is facilitating through its AICs, ANICs creating a self-enhancing and continuously improving ecosystem of innovation and entrepreneurship across the length and breadth of the country.

Summary

This chapter illustrated the monitoring framework and various assessments that ATL must undertake, to ensure that efforts are being made in the right direction.

The next chapter focuses on celebrating the innovation journey and how students could be encouraged through recognitions, with a glimpse of the various opportunities being provided to students, who have demonstrated exceptional innovation potential.

Making Dreams a Reality: Celebrating Innovation

The ATL must encourage, celebrate and recognize the efforts of students, teachers and mentors towards making it successful. Recognition and appreciation not only help to encourage more efforts, but also spread awareness about the impact being created through the mission[12]. This chapter also discusses the various opportunities being provided by AIM to student innovators who have demonstrated exceptional innovation potential.

8.1 Atal Tinkering Lab Wall of Fame

AIM under NITI Aayog initiated the ATL Wall of Fame, a platform where inspiring innovation stories from the students, teachers and mentors are shared on a regular basis. These stories are related to events where they have participated or also about their innovation journeys with the ATL.

The ATL Wall of Fame stories can be downloaded here:
http://aim.gov.in/newsletter-march.php

8.2 Social Media Stories

AIM under NITI Aayog encourages all students, teachers and mentors to post their innovation stories on social media platforms, which are then shared by AIM. These stories not only help in sharing the contribution of ATL towards changing the innovation mindset of the country, but also serve as incentives for our stakeholders for their commitment towards this national mission.

8.3 The Tinkerer's Opportunities

ATL is providing students an opportunity to transform their dreams into reality. This can be easily vouched for by those, who did not get such an opportunity when they went to school. The ATL is not only providing an ignition to the growth and innovation mindset of the students, but also encouraging them to dream beyond – to spread their wings and graduate from an innovator to an entrepreneur.

With the support of corporate partners, ATL students who have demonstrated a higher level of innovation appetite are now being exposed to advanced technologies through various AIM programs, which help them understand the intricacies of innovation, in their continuous pursuit of solving community issues.

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[12] Cash prize awards aren't enough to incentivize young students to Innovate, NITI Aayog, 2018

a) **ATL Student Innovator Program**

The ATL Student Innovator Program (SIP) is a 3-month long engagement program, designed to enable ATL students to further refine and prototype their innovations, with the goal of making it a market ready product/service. The ATL SIP was offered to the top 30 winning teams of the ATL Tinkering Marathon 2017. Additionally, these 30 innovations found place in an ATL top 30 compendium launched by Dr. Rajiv Kumar, Vice Chairman, NITI Aayog.

The ATL Top30 compendium can be downloaded here:
http://aim.gov.in/pdf/top30final-low.pdf

Launch of the ATL Top 30 Compendium at NITI Aayog

b) **ATL Student internships**

The best performing ATL teams were rewarded with a unique and first of its kind of an opportunity to intern at a multinational partner, IBM, at their Bengaluru campus.

ATL Student Internship Felicitation at IBM, Bengaluru

c)   **Participation and recognition at national and international challenges**

The ATL schools that are performing exceptionally well, and winning some of the AIM organized challenges, are provided several opportunities to participate in external innovation related events and exhibitions. Some of the notable examples include **World Robot Olympiad**, an international level robotics challenge, **Nobel Prize Series, India International Science Festival, Vibrant Gujarat summit, Makerfaire, Makermela and several others**.

d)   **Innovation Exchange Program**

AIM-Sirius Innovation Festival – The Indo-Russian ATL Innovation Boot-camp is a first of its kind initiative, where high schools students across two different countries came together to innovate and solve world's common problems. This is the beginning of a new era for India and Russia bilateral relations, and an opportunity to create an innovation exchange bridge for our youth, to equip them with globally relevant skills. A four-day Indo-Russian Innovation boot-camp for a Russian student delegation, to co-create innovations with ATL students, across five themes including mobility, agritech, health, space and clean energy. The four-day Indo-Russian ATL innovation boot-camp was organized with support from Department of Design, IIT Delhi, where young student innovators leveraged technologies available in Atal Tinkering Labs to solve real problems on ground, leading to innovations which could be further developed, productized and subsequently commercialized. The innovations were showcased to the Honorable Prime Minister of India and the Honorable President of Russia.

AIM-SIRIUS Student Innovators with Hon'ble Prime Minister of India, Shri Narendra Modi and Hon'ble President of Russia, Mr. Vladimir Putin

Collaborating for an Impactful
Atal Tinkering Lab

On the sidelines of the four-day bootcamp, AIM and Russia's SIRIUS Educational Centre inked a Statement of Intent, as part of which Russian and Indian students from ATL schools shall be selected for exchange programs, annually.

*NITI Aayog Team at AIM-SIRIUS Innovation Festival*

A video capturing the journey of the AIM-SIRIUS Innovation Festival can be downloaded here:
https://www.youtube.com/watch?v=GDEl5f-g5qo

Summary

This chapter shares how inspiring innovation stories should be recognized and how AIM is providing prestigious opportunities to young innovators of India, to help them transform their dreams into reality.

LIST OF PARTNERS
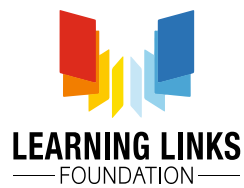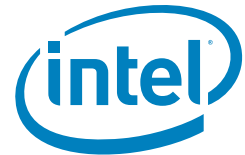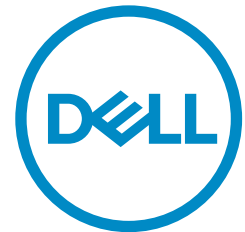
Tinker Tinker budding Innovation Stars,
AIM your dreams to take you far,
Inspiring your imaginations to soar so high,
Sparkling like diamonds in the
Indian Innovation Sky!

Ramanathan Ramanan
Mission Director
Atal Innovation Mission
NITI Aayog

Happy Tinkering 🙂