The Atal Tinkering Lab Handbook 2.0

Journey towards an Innovative 'Aatmanirbhar Bharat'

January 2021

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
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MESSAGE

With diversity as their engine and education as their fuel, the young tinkerers of this nation are the drivers of innovation who will make India a global powerhouse. Innovation in our country needs to take a front seat in our growth journey to transform into a developed country.

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. I am buoyant with optimism to witness the promising innovations by the young pioneers from ATLs located in different corners of this country. These innovators make me wonder what the young children of this nation can achieve when given the opportunity to think unconventionally in order to combat challenges faced not only by their fellow country men and women but also by the rest of the world.

I congratulate the AIM team for drafting the ATL Handbook which will take you through the journey of creating an exceptional ATL in your school and give you a glimpse of the thought behind each of the processes within the ATL.

My best wishes to all ATL students, teachers and mentors for their continuous support and dedication in creating the next generation of innovators of India.

(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

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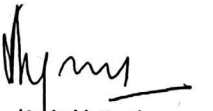
Message

Atal Innovation Mission, NITI Aayog, is establishing an innovative mindset in India through the Atal Tinkering Lab initiative. With over 5000 ATLs established till date and with the target to establish 10,000 ATLs by FY 2020-21, AIM's Atal Tinkering Lab initiative is the largest tinkering movement in the world.

The Atal Tinkering Labs foster project-based and research-based learning over the traditional education systems. This is critical for the demographic dividend of India, who are becoming a generation of job creators rather than job seekers.

ATLs provide tools and skills to young minds, who use Design Thinking approach to identify community problems. Further, the AIM team has created a complete ecosystem where the India of the next decade will be highly skilled with an entrepreneurial mindset that will emerge from its grassroots.

I am extremely glad to share my thoughts as a part of ATL Handbook 2020. The ATL framework in this handbook has been carefully designed and curated to enable schools to reach their full potential. I urge all states, education bodies and schools to leverage this as their own innovation compass.

My best wishes to everyone contributing towards this national movement.

(Amitabh Kant)

Place: New Delhi
Date: 08-07-2020

" 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

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मिशन निदेशक, अटल इनोवेशन मिशन
अतिरिक्त सचिव, नीति आयोग
भारत सरकार
संसद मार्ग, नई दिल्ली
Mission Director, Atal Innovation Mission
Additional Secretary, NITI Aayog
Government of India
Sansad Marg, New Delhi

Over the past 3 years, Atal Innovation Mission (AIM) at NITI Aayog has been at the forefront of creating and promoting a holistic ecosystem of innovation and entrepreneurship across the length and breadth of the nation, involving state and central government, academic and research instituions, industry and non governmental organizations in a synergetsically integrated and collaborative manner.
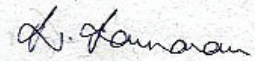
At the school level, AIM is nurturing young minds to innovate through a network of thousands of Atal Tinkering Labs. (ATLs,) facilitating transformational changes from a rote learning mindset to stimulating creativity, problem solving and innovative thinking within young school children from Garde VI to Grade XII in millions of students nationwide.

As of date, 10000+ schools have been selected for ATL establishment and more than 5100 schools have already established an operational ATL in their school across 660 disricts with over 70% of the schools government / government aided schools and over 70% in girsl and co-ed schools. ATLs are open to every child of the community without any bias or prejudice. More than 2+ million students, the possible innovators of tomorrow, are exposed to various 21st century skills and technologies including Problem Identification, Design Thinking, Artificial Intelligence, 3D printing, Robotics, electronics, IoT, Game Development, App Development and many more. To achieve all of the above this, AIM has been actively building the ATL pedagogy in collaboration with industry, academia, start-ups and grassroot innovators of India.

This Atal Tinkering Lab handbook is a guide of the ATL framework – (S.E.E.C) - Select, Establish, Enable, Celebrate!. We are proud that the ATL program is homegrown in India, and possibly the largest such government driven initiative anywhere in the world to foster a problem solving innovative mindset in young schools students who are going to architect the world of tomorrow for the next generation. The ATL framework in this handbook will help any school across the country to setup and manage ATL operations and adopt the pedagogy within their academic ecosystem.

I would like to thank the ATL students, ATL in-charges, teaching and non-teaching staff, Principals, Parents, Mentors of Change, our Corporate Partners, the ATL community and the ATL team at AIM, NITI Aayog who have been greatly instrumental in catalyzing and accelerating the 'ATL Tinkering Revolution' in India.

We are proud to launch the ATL Handbook 2020 which can be used by all schools, ATLs or non-ATLs to understand the vision, concept, operations and impact of the Atal Tinkering Labs in their schools. My best wishes to all the neoteric innovators and the future architects of modern New India.

Preface

The Atal Tinkering Lab program has become a national movement which is revolutionizing the Education Ecosystem of India. The goals and vision of the ATL program ties in beautifully with the National Education Policy and will play a pivotal role to implement 'Experiential and Project-Based Learning' model in India. The ATL ecosystem in a school facilitates a fresh learning-by-doing teaching and learning methodology. This keeps both the teacher and the student engaged and excited.

The 21st century needs a radical and disruptive change to a student's learning processes. With each passing day, new technology interventions by the industry are challenging the education system to create Future-ready Makers. 'Tinkering' and 'Making' are natural human skills which now need to be embraced with technology. And we at Atal Innovation Mission have embarked on this journey.

The objective of this book is to provide a robust framework and action plan of all the aspects of the Atal Tinkering Lab Program. The 'Select-Establish-Enable-Celebrate' framework captures the program in a simple yet elegant manner. This framework is replicable and can be implemented by any school, institution, department or country.

The progress which we have made would not be possible without the support and guidance of distinguished individuals of our country.

I would humbly like to thank NITI Aayog Vice-Chairman Dr. Rajiv Kumar, CEO Mr. Amitabh Kant and Mission Director Mr. Ramanathan Ramanan, Atal Innovation Mission, for their agile and strong leadership which helped ATL to become a national movement across India. I also express my sincere gratitude to all members of AIM's Mission High Level Committee, including Prof. K. VijayRaghavan, Dr. Renu Swarup, Prof. Ashutosh Sharma, Prof. Tarun Khanna, members of NITI Aayog family, who have been continuously guiding and supporting us towards creating the vision of AIM, and encouraging us at every step in our journey.

To make any program successful, it is important to have strong partnerships with Industry, academia, and various departments within the Government.

My sincere gratitude to the Ministry of Education, Department of Biotechnology, Department of Science & Technology, Cell for Intellectual Property Rights Promotion and Management, Startup India, Invest India,

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 centre 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. I would like to thank the Ministry of External Affairs, the Ambassadors and Embassies of Singapore, Russia, and Sweden; and the Ambassadors and Embassies of India in Singapore and Moscow, Russia who have helped the ATL students reach the global stage.

My gratitude to academic institutions IIT Delhi and IIT Bombay, and special thanks to the AIM Incubators – C-CAMP, Amrita TBI, Aartech, 36Inc, Banasthali Vidyapeeth, Amity IC, JKLU, Sikkim Manipal University, NMIMS, Jyothy Institute, BIMTECH, CCMB, MIT-ADT, ALEAP, Great Lakes who supported the ATL Student Innovator Program, while helping students in furthering their innovative ideas.

My special acknowledgement for the co-operation and support from the industry – NASSCOM FutureSkills, Dell, Learning Links Foundation, IBM, Adobe, Lego Education, Network Capital, SAP, tGELF, NIC-CollabCAD, MyGov, CSIR-Jigyasa for their contribution and commitment towards building a vibrant community of tinkering and innovation in India.

I thank all our Mentors of Change, who have inspired our young innovators, and supported them whole heartedly. 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 NITI Aayog - Mr. Shashank S. Gore, Mr. Manglesh Yadav, Mr. Vedant Sharma, Mr. Pitambar Sahoo, Mr. Harish Chowdhry, Ms. Ishita Agarwal, Mr. Pramit Dash, Mr. Desh Gaurav Sekhri AIM administration and finance teams for relentlessly supporting the ATL program. My special words of praise and thankfulness to the core ATL team – Ms. Madhuri Pal, Ms. Naba Suroor, Ms. Vishnupriya Bijapur, Ms. Swati Rao, under the guidance of Ms. Deepali Upadhyay, and Ms. Sumaiya Yousuf for scribing and editing the ATL Handbook 2.0.

In an effort to celebrate the grassroot innovations in different parts of India, AIM will continue to strategize, design and implement pathbreaking initiatives, which will pave the way for developing the 'Aatmanirbhar Bharat'.

Let's Make, Break, Create and Innovate!

Happy Tinkering

Ronak Jogeshwar

Atal Innovation Mission

NITI Aayog

Contents

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
ACIC	Atal Community Innovation Centre
MoC	Mentor of Change
PFMS	Public Finance Management System
MoA	Memorandum of Agreement
AAB	ATL Advisory Body
GeM	Government e-Marketplace
ATM	Atal Tinkering Marathon
TTT	Teachers Training Program
CSR	Corporate Social Responsibilities
SIP	Student Innovator Program
MSME	Micro, Small and Medium Enterprises
IP	Intellectual Property

RMoC	Regional Mentor of Change
EMoC	Exemplary Mentor of Change
ToC	Teacher of Change
SEP	Student Entrepreneurship Program
PMO	Prime Minister's Office
SoM	School of the Month

Genesis of Atal Tinkering Labs (ATLs)

1. Genesis of Atal Tinkering Labs (ATLs)

INTRO

This chapter introduces the entities that initiated the program of ATL. It gives a brief overview of the program objectives and its overarching framework.

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. 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 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 programmes for the Government of India, NITI Aayog also provides relevant technical advice to the Centre 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:

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

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 grassroot level and aggregate these progressively at higher levels of government

To design strategic and long-term policy and program frameworks

To create a knowledge, innovation & 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.

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

The Atal Innovation Mission (AIM) is a flagship initiative of the Honourable Prime Minister's Office (PMO), housed at the NITI Aayog, to promote innovation and entrepreneurship across the length and breadth of the country.

AIM, 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) program, AIM, NITI Aayog is fostering the spirit of creativity and innovation at school level, wherein students get an opportunity to experience 21st century skills such as ideation, design thinking, IoT, rapid prototyping, etc. and widen their intellectual horizons in pursuit of

solutions to day-to-day problems and showcase their innovations at prestigious national and global platforms. To further nurture these school students, the Mentor of Change (MoC) program which is a citizen led national movement was launched and is being led by AIM, NITI Aayog, wherein skilled professionals provide pro-bono mentoring to young ATL innovators, with a strong sentiment towards nation building.

AIM, NITI Aayog'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. Atal Community Innovation Centres (ACICs) through PPP driven model are encouraging the spirit of innovation with a focus on underserved/unserved regions of the country, such as rural, tribal, aspirational districts, hilly and/or coastal areas which at present lack a vibrant startup and innovation ecosystem.

AIM, NITI Aayog 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, NITI Aayog in collaboration with five Ministries of the Govt. 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, the Atal Research and Innovation in Small Enterprises (ARISE) program encourages the Ministries of Government of India to invest in research and innovation, and explore to leverage relevant innovations into the public system.

1.3   Atal Tinkering Labs

With AIM, 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, NITI Aayog, NITI Aayog, Government of India, to nurture an innovative mindset amongst high school students across the length and breadth of India.

Within a ATL 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 and so on.

It will enable India to create a dent in the Global Maker's movement (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. ATL is also providing other sections of the community including parents, mentors and other individuals interested in innovation to give life to their ideas.

Under the ATL scheme, grant-in-aid of up to ₹ 20,00,000/- (Rupees Twenty Lakhs Only) is provided to schools selected for setting up the ATL.

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[2] Dougherty, D. (2012). The Maker Movement. Innovations

As on December 2020, 14916 schools have been selected for establishment of ATLs and more than 7000 ATL schools have been sanctioned, covering more than 90% of all the districts and 110 Aspirational Districts of India. These labs, established in both government and private schools and majority in co-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 published by NITI Aayog, over 10,000 ATLs will be established by FY 2020-21.

Significance of ATL 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 facing the community.

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 a generation of young innovators ready to take on the further challenges, in their constant pursuit to build the New India.

A video explaining the relevance of Tinkering can be viewed here:

https://www.youtube.com/watch?v=f4Sqd6RDloE

Vision of ATL

The broad vision of the ATL program includes the following:

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

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

Fig 1.1 - Innovators from India and Russia at Sirius Centre, Sochi, Russia

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

ATL Program Design & Framework (Select – Establish – Enable – Celebrate)

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 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. Students are introduced to 4 different levels of tinkering (Described in detail in ATL Curriculum) , 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. A video explaining the concept of Tinkering can be viewed here:

https://www.youtube.com/watch?v=78CcarCgt8Y

Spotlight Story #1: ATLs in Lonesome Corners

District: Vizianagram, Andhra Pradesh

Vizianagram, Andhra Pradesh has long been recognised as a 'beemaru' i.e. sick district and has recently been identified as an Aspirational District. With the vision and mission to uplift such remote districts in the country and embed 'tinkering & innovation' into the young brains of Vizianagram, Andhra Pradesh, 20 ATLs were set up in government and private schools of the district in 2018.

The Principal of Chaitanya Public School, Ukkunagaram, ENVSL Chandrika, said, "Representatives from ATL visited the school to set up the ATL and helped us understand the scheme better. The lab will provide a chance for the children to work with tools and equipment to understand the concepts of science and technology." In July 2019, only a few months after establishment, two schools i.e. ZPHS Kumaram and Sri Sai Surya School shone through the ATL School of the Month Challenge and were recognised as ATL School of the Month.

To drive innovation amongst the stakeholders in the community several teacher training sessions and vendor training sessions were also organised for the schools. One such teacher training session inspired a few teachers from the ATLs to innovate and inspire their students. Mr. Chandra Rao and his group participated in the four-day State Atal Tinkering Lab (ATL) Teachers workshop, conducted by NITI Aayog with the support of IBM, at Sri Krishnapuram AP Social Welfare Residential Educational Institutions Society (APSWREIS) School and Junior College. P. Chandra Rao, a PGT in Physics at A.P. Model School and Junior College at Shikaruganji of Vizianagaram district, who, with the help of a like-minded teachers, developed a low-cost flyover with 'collapsible' metal structure to reach the already constructed concrete flyover at Manappuram. The collapsible metal structure, which could be designed to carry a permissible weight, would operate with solar power and sensors to lift, and collapse when not required.

The ATL program can be broadly classified into 4 major phases as shown in Fig 1.2:

Robust System Driven Two Way Communication

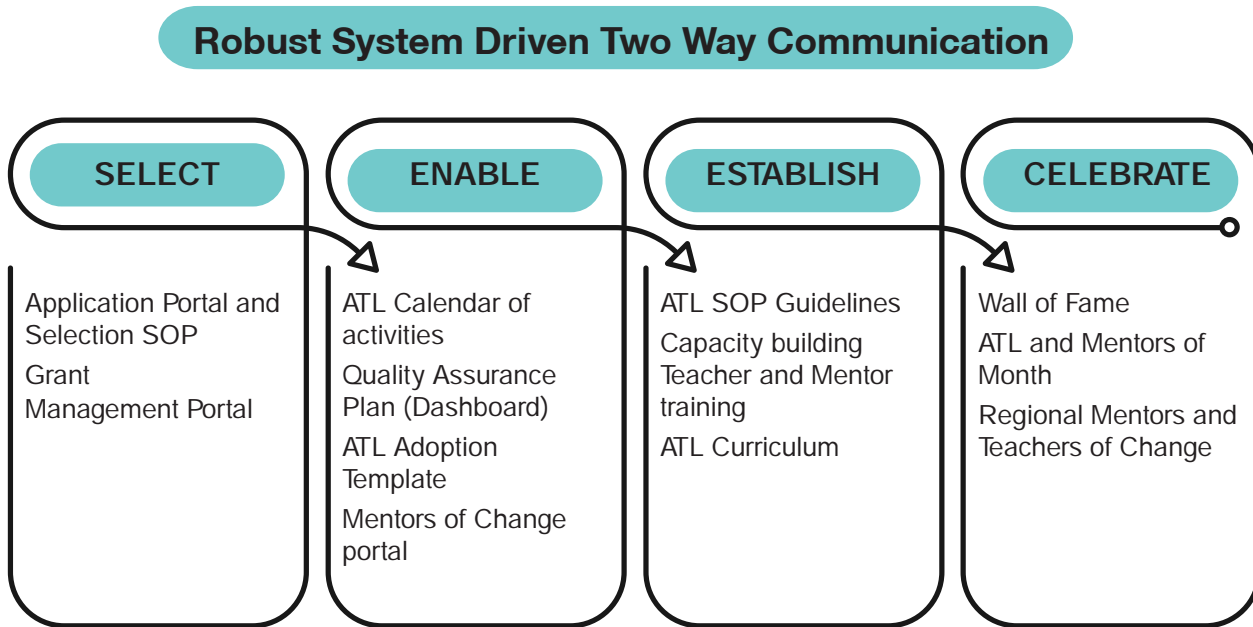| SELECT	ENABLE	ESTABLISH	CELEBRATE
Application Portal and Selection SOP	ATL Calendar of activities	ATL SOP Guidelines	Wall of Fame
Grant Management Portal	Quality Assurance Plan (Dashboard)	Capacity building Teacher and Mentor training	ATL and Mentors of Month
	ATL Adoption Template	ATL Curriculum	Regional Mentors and Teachers of Change
	Mentors of Change portal		

Fig 1.2 – Framework of ATL program

The next 4 chapters will explain each phase in-depth and guide the reader step by step through the application & selection process, how to set up an ATL within their school and maintain it successfully as well as enable the ATLs to reap the opportunities and rewards that come by for consistent innovative students, teachers and mentors.

SUMMARY

This chapter introduced the genesis of ATL highlighting the significance of tinkering for India. It included the introduction, program design & framework as well as the overall vision of the initiative. The next chapter highlights how schools commence their ATL innovation journey, describing the selection, compliance and subsequent grant-in-aid disbursement process.

Fig 1.3 ATL Innovators with the H.E Ambassador of India to the Russian Federation.

CHAPTER 2

Selection of
Atal Tinkering Lab

INTRO

This chapter explains the first phase of the ATL framework – Selection. It will guide the reader through the entire application and selection process for an ATL and the documentary compliance required by ATLs once they are selected.

2.1 Digital Application and Challenge Based Selection

Schools in India (having at least Grade/Class VI to X) recognized by Ministry of Human Resource and Development (MHRD) and managed by State/Union Territory/Central Government, Local body (Municipality/ Nagar Nigam), Private Trusts/Society or Tribal/Social welfare Department can apply for financial support in the form of ATL Grant-in-Aid.

Interested schools intending to apply for ATLs may visit the AIM website and submit their application online to the Atal Innovation Mission, NITI Aayog. The ATL online application portal is a seamless platform developed for schools to submit their ATL applications. A three stage process is followed as described below:

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.

Stage 2: Screening of applications: 1-2 months - 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. Eligible applicant schools shall be evaluated and ranked based on these criteria.

Stage 3: Final evaluation: 1 – 2 months - Assessment is made based on more subjective parameters on how committed the school is to utilize the ATL as a platform to transform their school into a local innovation hub.

After the final evaluation, a fixed number of schools are announced in the form of a list on AIM website. The number of selected ATLs announced at any point of time is based on budgetary allowance and approval of competent authority. To receive the grant-in-aid, the schools will be required to complete the compliance process which is detailed in the next section.

2.2   Compliance

Compliance refers to the adherence of AIM, NITI Aayog's requirements in terms of proper documentation, such that grant-in-aid can be released to the shortlisted ATL School. There are two components of compliance viz. documentary compliance and Public Finance Management System (PFMS) compliance.

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.

Upon successful document compliance, the activation process for PFMS, Government e-Marketplace (GeM) and MyATL Dashboard credentials will be initiated by AIM.

PFMS Compliance: In addition to the documentation compliance, the school is simultaneously required to complete the PFMS compliance as well. 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.

Upon successful completion of the above steps, the Tranche 1 of ATL Grant-in-Aid of Rs. 12,00,000/- (Rupees Twelve Lakhs Only) will be sanctioned and transferred to the ATL Bank Account of the school. The grant must be spent exclusively for the specified purpose within the stipulated time of a maximum period of 5 years, with ₹10,00,000/- (Rupees Ten Lakhs Only) for capital expense and remaining ₹10,00,000/- (Rupees Ten Lakhs Only) for operational and maintenance expenses.

The release of subsequent funds shall be a function of the performance of an ATL, the utilization of the previous grant and the submission of details required on MyATL Dashboard. Utilization Certificates for each financial year must be furnished with PFMS and EAT reports updated to date. The relevant details are available in the ATL Guideline document.

Schools must carefully read and adhere to all requirements mentioned in the below ATL Guidelines document.

Refer the ATL Guidelines Document for details:

ATL Guidelines :
https://aim.gov.in/guidelines-for-school.php

Fig 2.1 - Hon'ble 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 successful establishment of ATL, including procurement, capacity building and absorbing the ATL seamlessly within the school.

Establish the Atal Tinkering Lab

INTRO

This chapter details out the next phase of the ATL framework – Establish. It will elucidate the entire process that an ATL needs to follow once they receive the grant including procurement of equipment, setting up the lab as well as engage in capacity building of the ATL.

3.1   ATL Standard Operating Procedure

The ATL journey of the schools begins with the sanction of ATL Grant-in-Aid. Once the school has received their ATL Grant-in-Aid, they must pay great attention towards designing the ATL space, procurement through GeM, identifying the right human resources and training them. These elements shall be crucial towards ensuring that the facility is able to meet its expected outcomes. Schools must setup the ATL, procure ATL Equipment through GeM, inaugurate and make it operational within 3 months after receiving the ATL Grant-in-Aid money.

Designing the ATL space

Since the ATL will be an open experimentation and innovation bed, it is extremely essential to follow the proper design and layout guidelines. Set in an expanse of 1000 to 1500 sq. ft. area, the ATL space should be one single room with maximum open space, such that there is room for mentoring as well as for collaborative project work.

Procurement of Equipment

All ATL schools must procure equipment through Government e-Marketplace (GeM) as per the mandate by the Government of India to ensure transactions are done with credible vendors to maintain transparency. 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.

Details on ATL Standard Operating Procedure is elucidated within the ATL Guideline Document:

ATL Guidelines :
https://aim.gov.in/guidelines-for-school.php

Fig 3.1 - ATL lab arrangement, modular furniture, proper display and storage of tools, lighting.

3.2   Identifying Resources and Building Capacity

It is imperative for each school to identify resources for the ATL. The lab needs to be supported by teachers who understand the philosophy and purpose of ATL, with the right technical knowledge, experience and skill sets so that they can help smoothen the path towards innovation for their students. Once identified, these dedicated ATL teachers will hereby be referred to as 'ATL in-charges'.

It is the responsibility of an ATL in-charge to nurture the ATL innovation ecosystem, to facilitate generation of ideas and keep students motivated towards tinkering.

Various research studies[4] have indicated that when teachers are effective classroom managers, students achieve on a higher level and display a deeper interest in the subject. Therefore, in order to inculcate innovation into the DNA of young students, it is crucial to equip the ATL in-charges responsible for empowering these students with the technical know-how and relevant skill sets.

AIM, NITI Aayog, along with its partners, envisaged and conceptualized 'Unbox Tinkering' – a unique ATL Teacher Training Program to build capacities of resources attached to the ATLs. AIM encourages school faculties and ATL in-charges to undergo tthe training being organized online or in-person across the country to learn about and identify with tinkering, innovation and the objectives of ATL. The program aims to empower the participants with the quintessential tools and technologies and includes lecture series, discussions and hands-on training sessions, thereby, allowing interactive learning and free-flow of ideas. Till date, more than 2000 teachers have been trained by various partners including Intel, IBM, Dell, SAP, Adobe, KPIT, Learning Links Foundation, and others. Further details on 'Unbox Tinkering' can be found in the document below:

https://aim.gov.in/pdf/ATL_Teacher_Training.pdf

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[4] Classroom Emotional Climate, Student Engagement, and Academic Achievement: Maria R. Reyes, Marc A. Brackett, Susan E. Rivers,Mark White, and Peter Salovey at Yale University, Freiberg et al. 1995; Omoteso and Samudara 2011; Stronge et al. 2011; Stronge et al. 2008, Kunter et al. 2007

Spotlight Story #2: 'Un-box Tinkering'

School: Best High School, Ahmedabad, Gujarat

Partner: Intel & IBM

"Unbox tinkering Workshop was conducted by NITI Aayog in collaboration with Intel and IBM at Ahmedabad in Best High school. We, Mrs. Manisha Girolkar and Mrs. Swati Kale attended this workshop along with 35 participants from 15 schools all over India. It gave us a new outlook about the mission of NITI Aayog to inculcate innovation skills among young students using Atal Tinkering Labs. We got an opportunity to interact with Dr. Ayesha Chaudhary from Atal Innovation Mission on Skype. She enlightened us about the vision behind 'tinkering' and gave us guidelines w.r.t. the forthcoming activities being organized by AIM, NITI Aayog. We also got chance to meet Director of Gujrat Science and Technology Department Mr. Narottam Sahoo. He explained the importance of Do-IT-Yourself approach especially in the field of Science and Technology. He also emphasized on developing critical thinking ability among the students. It was really an enriching experience for us. It created a good forum for all enthusiastic and innovative minds who really enjoy working with children."

#UnboxTinkering

Spotlight Story #3: Attitudinal Shift amongst Teachers

School: MES BSM English Medium School, Pune

Principal: Geetanjali Bodhankar

"Be the change you want to see in the world"

Mahatma Gandhi's words have been the guiding force behind the philosophy followed by Mrs. Geetanjali Bodhankar, Principal, MSME BSM English Medium School, Pune, Maharashtra. In order to bring about an attitudinal shift amongst teachers in a manner that they go beyond the regular academic syllabus of the school, the school administration focused on immersing not only all the students but also all the teachers into the ATL orientation process. Furthermore, the school also identified enthusiastic teachers in the fields of Science and Mathematics and encouraged them to be a part of teacher training sessions organised by AIM, NITI Aayog, mentoring sessions etc. Most importantly, the school tried to cultivate and foster synergies between various stakeholders involved in the ATL i.e. students, parents, teachers, mentors of change, community, alumni etc.

The result of this has been a wholehearted involvement by the teachers in tapping the innovative potential in students. As team members, they are working beyond the usual mandate of working as per the prescribed syllabus. They are now effectively engaged in a process of education that manifests as the emotional, cultural and technical upbringing of future citizens who are going to empower the nation's quest for competitive excellence.

Furthermore, this methodology has resulted in higher student enrolment in ATLs, increased enthusiasm and better innovations. The school's innovative performance has not gone unnoticed by mentors and dignitaries.

3.3   ATL Curriculum

Post successfully completing the 'Unbox Tinkering' program, ATL in-charges are equipped to pass on the knowledge and ignite the spirit of tinkering within students. To initiate this, AIM provides a rich repository of content and resources on its website, for ATL in-charges to learn from to ensure a successful implementation of the initiative. The content includes videos, documents, and other hand holding material for the ATL-in-charge to conduct the ATL activities and sessions, in accordance with the AIM, NITI Aayog 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.

For instance, before introducing the students to the concept of Ideation, it is recommended that the ATL In-charge thoroughly reads and understands the reading material provided on the AIM website. The ATL In-charge will also find a PowerPoint presentation with definitions, videos etc. that he/she can use to introduce the concept of ideation to his/her students.

Furthermore, to collectively drive the charter of developing creative skills and spreading digital literacy, partners have collaborated with AIM, NITI Aayog by providing free access to their technological toolkits and creating modules for children on cutting edge technologies of Artificial intelligence, Drones, Gaming, Space, Computer Aided Design (CAD) and so on.

The ATL In-charge can go through the resources by clicking on the link given below.

http://aim.gov.in/resources-for-atl-incharge.php

Furthermore, 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.

Integrating ATL with the school curriculum via four levels of tinkering

The School Principal and the ATL-in-charge must take proactive steps to ensure student engagement and that they get sustained and continuous opportunities 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, NITI Aayog 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 four levels of tinkering, the kind of students to be enrolled with their respective objectives can be found Fig 3.2 below:
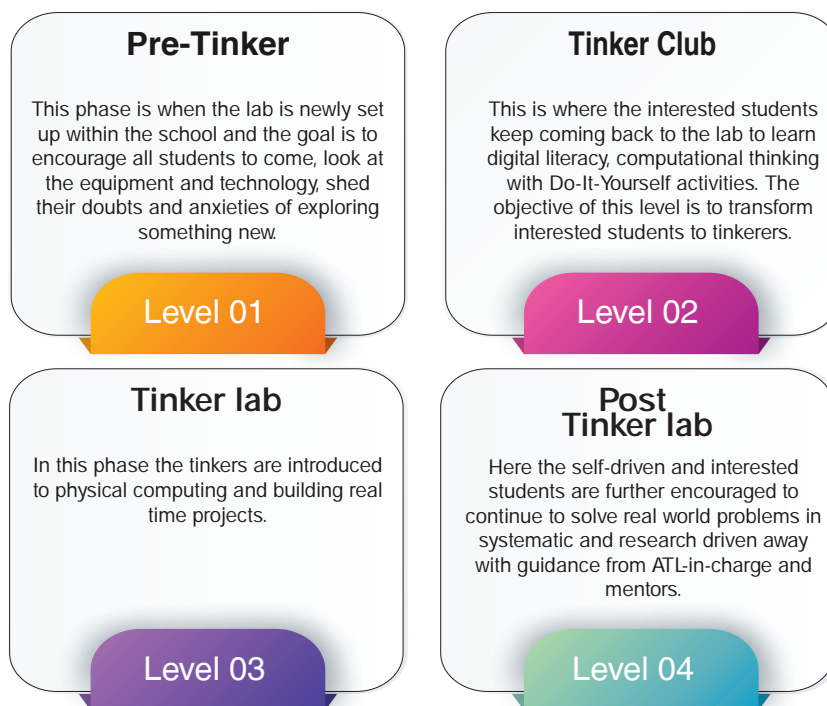
Pre-Tinker

This phase is when the lab is newly set up within the school and the goal is to encourage all students to come, look at the equipment and technology, shed their doubts and anxieties of exploring something new.

Level 01

Tinker Club

This is where the interested students keep coming back to the lab to learn digital literacy, computational thinking with Do-It-Yourself activities. The objective of this level is to transform interested students to tinkerers.

Level 02

Tinker lab

In this phase the tinkers are introduced to physical computing and building real time projects.

Level 03

Post Tinker lab

Here the self-driven and interested students are further encouraged to continue to solve real world problems in systematic and research driven away with guidance from ATL-in-charge and mentors.

Level 04

Fig 3.2 – Illustration of four levels of Tinkering

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, makers and eventually innovators.

A sample ATL schedule is provided in Fig 3.3, 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	

Fig 3.3 - Sample ATL schedule

Spotlight Story #4: Integration of ATL with school curriculum

Name of School: Jubilee Hills Public School, Hyderabad, Telangana

ATL-in-Charge: Udaya Lakshmi P, Gangadhar G

To create an ecosystem of innovation within the school, the ATL incharges have ensured that the doors of the ATL are open to all the students. Students are taken to the Atal Tinkering Lab during the substitution or 'zero' periods where they are introduced to the ATL, the machines and the basic technological concepts. This process ensured that each and every student from the school is given an opportunity to understand the basics of innovation. The interested students are introduced to details of each concept through extensive workshops on 3D printing, arduino programming, etc. organised in collaboration with external partners. At this stage, the students who show an aptitude for programming, 3D Printing, etc. are taken through the advanced modules by the Mentors of Change.

The students are, now, divided into groups to ensure peer-learning and project initiation. The facilitator/ATL In-charge plays a significant role in ensuring that each student gets one-on-one attention. The students who excel at different technologies are made student 'tutors' - they are given the task to teach and to help other students finish their respective projects. Furthermore, these student tutors are alloted extra time in the ATLs so that they are able to conclude their projects. "Conducting classes and utilization of time effectively has to be planned in such a way that the regular curricular hours are not affected while at the same time, the ATL classes are also streamlined." The ATL In-charges recognised that after school-hours can be utilized for ATL. he result of the organised integration of ATL with the school curriculum was higher enrollment in ATL, effective utilization of 'free' or 'zero' periods and post-school hours, increased participation in regional and national competitions and increased participation in innovation-workshops.

"

Spotlight Story #5: Enrolling and engaging the ATL students

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

ATL-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 (APRSWS) 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?

"

3.4 Communication channels between ATLs and AIM

One of the many crucial parameters that play a vital role in making a program successful, impactful and effective is the communication between its internal and external stakeholders. Post establishment of the lab and during its operations, it is natural for an ATL in-charge to have questions and require assistance. A free flow of information not only answers these queries but also eliminates ambiguity keeping the stakeholders involved and informed about the developments of the program. Some of these communication channels are listed below:

ATL Query Resolution Portal

For any query, visit the online query resolution portal on the AIM website. The ATL team ensures that all queries are resolved at the earliest. The URL for the same can be found below:

https://www.youtube.com/watch?v=97BZoIpv_Tc

To understand how to use the query portal, please click on the link below:

http://expd.pro/cgrms-atl/register/

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. All ATLs are encouraged to create Facebook and Twitter accounts, share ATL activities, innovation stories etc. Schools are advised to tag 'Atal Innovation Mission' and 'NITI Aayog' in all their posts and use the hashtag - #AIMtoInnovate, on Twitter use @AIMtoInnovate, YouTube use @AIMtoInnovate.

In order to receive regular updates from AIM, NITI Aayog, you can follow us:

https://www.facebook.com/AIMToInnovate

https://www.youtube.com/c/AIMtoInnovate

https://www.twitter.com/AIMtoInnovate

A tutorial video for creating a Facebook page can be found here:

https://www.youtube.com/watch?v=LDnSbsCpkNE

Messenger groups

Messenger groups such as WhatsApp facilitate swift information sharing, sharing of achievements/ accolade. It also allows schools to share best practices and engage in peer to peer learning. AIM has created state wise WhatsApp groups which help in connecting all ATLs with one another and create a sense of community.

Fig 3.4 – Principal Scientific Advisor to the Govt. of India, Prof. K. Vijayraghavan inspiring students to connect science and technology with innovation

SUMMARY

This chapter highlighted how the ATL-in-charge, along with the school management, shall lead the tinkering initiatives at the ATL. It gave an overview of the standard operating procedures of ATL as well as the ATL curriculum resources available to the in-charge and students. It introduced the capacity building program for in-charges and listed the various communication channels for ATLs to reach out to AIM for any query or assistance

CHAPTER **4**

Enable a Vibrant Atal Tinkering Lab Ecosystem

······· **INTRO** ·······

This chapter highlights the third phase of the ATL framework – Enable. It will narrate in detail the various activities undertaken by both AIM and the schools to enable an ATL to become a hub of innovation and creativity.

4.1   ATL Calendar of activities

Once the ATL is fully functional, the ATL in-charge has assumed his/her responsibility with confidence and the students are exploring their way in the world of tinkering, it is important that the ATL organizes and participates in regular tinkering activities, to keep the students engaged and inspired.

These activities 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. 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. 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.

Please find the link to the ATL Annual Calendar of Activities below:

https://aim.gov.in/ATL_Calendar.pdf

1.   ATL Community Day Celebration (14th April)

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 14th April every year, commemorating Dr. B.R. Ambedkar's birth anniversary, 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.

AIM has created the ATL Community Day brochure, which guides an ATL on how successfully celebrate the event, and provides a sample agenda and activities which may be conducted during ATL sessions. The Community Day brochure can be found here:

https://www.aim.gov.in/pdf/ATL_Community_Day.pdf

2.   World Intellectual Property Day Celebration (26th April)

Intellectual property (IP) is at the heart of every innovation and is crucial that every tinkerer and ATL in-charge understand IP rights and its protection. Celebrating World IP day is a way to encourage innovation and creativity and to understand the economic value that is generated from an innovation. AIM organizes a series of sessions along with experts, in partnership with CIPAM, DPIT, Govt. of India to raise awareness on different types of intellectual property and teach students and teachers the process of protecting their IP.

3.   National Technology Day Celebration (11th May)

National Technology Day is celebrated on May 11th every year to mark India's technological advancements and entrepreneurial spirit.

This day serves as reminder of India's technological achievements over the years and inspires children to embrace science and technology.

On this day, AIM organizes a series of live sessions along with experts to attract children to science and technology, and create awareness on the latest technological developments in India and across the globe.

4.   ATL Tinkerfest (May - July)

Tinkering in schools is now becoming a nationwide movement and the ATL Tinkerfest 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 Tinkerfest can be downloaded here:

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

Spotlight Story #6: Tinkering to Save Lives

School: Paljor Namgyal Girls' School, Sikkim

ATL Incharge: Ivan Lepcha

Supriya Sharma and Choden Tamang, two young innovators of class 9th from the Paljor Namgyal Girls' School, Sikkim were walking down the school aisle, when they noticed an old room getting renovated. They soon found out from their teacher, Mr. Ivan Lepcha, that a neoteric lab to be setup soon – The Atal Tinkering Lab. Since their first introduction to the ATL, the young innovators started participating in workshops and training sessions organised in their ATL. As a part of School of the Month Challenge, the two tinkerers reached out to the community to identify a problem statement. Through these interactions a clear challenge popped in their curious minds - road safety in hilly terrains.

These two students from the 'Tinker Club' of their school leverage the ATL resources and tools to devise a novel solution, a 'sensor-based robotic accident prevention technology for hill-roads'. Their innovation led them to win School of the Month Challenge. But this challenge was just the beginning. They brought laurels to the school when their innovation was among the Top 5 Exhibits showcased in Science and Technology for Harnessing Innovations (SAATHI) meet held during the India International Science Festival (IISF) by Department of Biotechnology in Lucknow, Uttar Pradesh. Furthermore, UNICEF recognized their story and their innovation when Choden was invited to speak at the World Children's Day student talk-series organised by UNICEF.

5.   ATL School of the Month

ATL School of the Month (SOM) is an opportunity for ATL schools to utilize the different resources and modules provided by AIM, NITI Aayog, conduct various sessions and workshops aligned with tinkering and innovation, and update all ATL activities on the ATL Dashboard.

Top schools which successfully and regularly update their ATL Dashboards are felicitated and featured on the official AIM website and Social Media handles.

6.   Gandhian Challenge (Launch Oct 2nd)

The year 2019 marked the 150th Birth anniversary of the Father of our Nation, Mahatma Gandhi who was not only a great leader and a social reformer but also an innovator par excellence whose creative and innovative ideas are of relevance till today. On this day, AIM launched the Gandhian Challenge for children to come together and innovate towards building a brighter World and a better future.

The goal of this challenge is to bring Gandhiji's way of life to the students of our country. AIM encourages students to read and understand the principles of Mahatma Gandhi to express their innovation.

7.   Children's Day Celebration (14th November)

Children's Day is celebrated in India on 14th November every year to commemorate Pandit Jawaharlal Nehru's birth anniversary. This day is pure joy and celebration of a child's innate curiosity and inquisitiveness.

Schools across India usually have a fun day planned for students on Children's Day. Taking note of this national celebration, AIM awards a special title to one boy and one girl from each ATL who are its most consistent, engaged and enthusiastic tinkerers, who will be called as the 'Top ATL Innovator of the year'.

8.   ATL Marathon (Launch 14th November)

The ATL Marathon is a flagship nationwide contest, where the ATL students identify a community problem and create an innovative solution for it. The ATL Marathon is designed to test students and hone their skills through a grueling 6-month long challenge teaching them to work towards sustainable and mindful innovation.

This challenge is unique in its approach that it tries to replicate an innovator's journey and gives students a glimpse into the real problems faced by our country and how to create long-term, impactful solutions. ATL Marathon's core principles are Research – Ideate – Innovate – Implement.

The top students of the ATL Marathon are selected through multiple rounds of evaluation and awarded the

AIM Student Innovator Programme (SIP) (See Student Programmes)

The summary of Top 30 innovations of ATL Marathon 2017 can be found here

https://aim.gov.in/pdf/top30final-low.pdf

The summary of Top 50 innovations of ATL Marathon 2018 can be found here

https://www.aim.gov.in/pdf/Coffee_Table_Book_Final.pdf

Fig 4.1 – Top 8 teams of ATL Marathon 2018 with the Hon'ble President of India

9.   National Science Day Celebration (28th February)

With the aim to commemorate the scientific work done by Sir. C.V. Raman and his discovery of the Raman effect, AIM, NITI Aayog along with the country celebrates 28th February as National Science Day. Nobel Laureate, Sir C.V Raman was a world-renowned physicist whose work inspires both young and old till today. To inspire students, introduce them to the world of STEM and research, AIM celebrates this day with children

by holding thought provoking interactive sessions with India's young scientists. The goal is to open the world of science, emphasize the role of research, and expose them to the life of a scientist in today's world.

4.2 Mentor of Change (MoC) Initiative

Apart from the inter school activities as mentioned in the previous section, 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. 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 horizons of the students by providing internship opportunities and organizing other programmes, especially tailored for the ATL students.

Mentor Application and Selection

In order to be a part of the Mentor of Change program by AIM, an individual must apply for the same through the AIM website once NITI Aayog/AIM announces the requirement for Mentors of Change. The link to the application form can be found below:

http://aimapp2.aim.gov.in/mentor2020/mentor_register.php

Further details of the program can be found in the Mentor Handbook below:

https://aim.gov.in/pdf/Mentors_of_India_27_January_2019.pdf

"

Spotlight Story #7: Mentor of Change

Mentor: Navaneethakrishnan Ramanathan

With Atal Innovation Mission NITI Aayog's Mentor India program, which is a first of its kind national initiative from the government of India, young and experienced professionals irrespective of their age, professional-linguistic expertise, and socio-economic background, are contributing voluntarily to transform the learning process in India.

Exemplary motivated professionals are engaged as 'Mentor of Change' to empower high school children in Atal Tinkering Labs, with the skills of the 21st century. Navaneethakrishnan Ramanathan's journey as a Mentor of Change is one that acts as a guiding light for many. Mr. Ramanathan was appointed as a MoC for Kamlavati Senior Secondary School, Tuticorin, Tamil Nadu. His mentoring mantra 'the more you teach, the more you learn' motivated him to travel to the school located 400 KMs away, regularly. In his own words, "As an academician, it was the love for teaching that made me partner with AIM as a Mentor of Change, however, it was the passion shown my students that made me visit the ATL located 400 KMs away again and again. The imagination and curiosity that you see in the eyes of these students is what sparks my energy. There have been times when their questions have kept me up at night and given me the opportunity to learn something new".

Under his mentorship, the students of Kamlavati School have gotten the opportunity to participate in national and international competitions such as IEEE 2019, where they bagged the third prize.

"

Enable a Vibrant Atal Tinkering Lab Ecosystem

4.3   Engaging the nearby community and non-ATL schools

In the previous sections we have seen how various ATL activities as well as the mentors of change are keeping the ATL students and in-charges engaged and inspired. There is however another crucial element of this equation that needs to be integrated in the ATL family - The community. 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 a 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:

1. **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.

2. **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.

3. **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.

4.4   Quality Measurement of ATL

The previous sections have taken you through the journey to transform an ATL into a hub of innovation with the help of activities and constant support from AIM, mentors and the community. However, for the successful implementation of any new initiative, good governance and regular monitoring are of paramount importance and form essential components of the program.

Therefore, all ATLs shall be evaluated on a monthly and yearly basis, using external evaluations as well as internal portals such as MyATL Dashboard supplemented with on-site visits.

Spotlight Story #8: Successful Integration of Community with ATL

Name of School: Government Model Senior Secondary School, Chauntra

State & District: Chauntra, Himachal Pardesh

ATL-in-Charge: Mr. Sandeep Verma

"When the ATL was established in Government Model Sr. Sec. School, Chauntra, integration of ATL with the community was a natural 'next step' after setting up the ATL and introducing the school students to the concept of ATL. I say that it was a natural next step because it is only through community integration that the experience and idea sharing process can be initiated."

Since its inception, ATL Chantra has been open to all the schools in Himachal Pradesh with the single goal of propagating the spirit of innovation in their state. This lead to the formation of Mind Grind : Team ATL Chauntra. Mr. Sandeep's ideology behind community integration showed its true result when two students, Ritika from Govt. Model Sr. Sec. School, Chauntra and Rashmi from Govt. Model School, Ghatta, came together to conceptualize and envisage 'The Smart Medicine Box'- a novel 3D printed full scale innovation that allows systematic and periodic dosage of medicines to patients.

External Evaluation

In September 2019, 285 ATLs among the 1107 operational ATLs underwent a quantitative assessment by Quality Council of India (QCI) and a review by Economic Advisory Committee of Prime Minister (EAC-PM). Both parties assessed the performance of an ATL with multiple objective parameters.

The assessment resulted in highlighting the various best practices being followed in schools as well as the challenges faced by some ATLs. It gave a macroscopic view of the ATLs across India and enabled AIM to understand the program's successes as well as take the required course-corrective measures to address the challenges faced by some schools.

Internal Portal - MyATL Dashboard

Schools need to compulsorily submit monthly reports on the Dashboard that helps AIM recognize each school's present engagement in ATL, participation in regional, national or international events & competitions and achievements and determine the suitability of the ATL for the next tranche of grant disbursement.

Link to ATL Dashboard - https://aim.gov.in/atl/

A step by step video will guide you in the process of filling monthly reports on the MyATL Dashboard.

https://www.youtube.com/watch?v=7VqU-HJwj2w&feature=youtu.be

4.5   Collaborations & Partnerships for an Impactful ATL

In the previous sections we had established the importance of involving different partners or stakeholders like Mentors of Change and the community to ensure successful implementation of ATL.

To take this forward, AIM has worked on forging robust partnerships with the industry and academia 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 these partners will be key to ensure the success of the program.

Partners help in expanding the technical horizon of the students by providing internship opportunities, guidance with their innovations as well as working with AIM to create student friendly technology modules such as Artificial intelligence, Drones, Gaming, Space, Computer Aided Design (CAD) and so on. These modules can be

found by clicking on the link given below.

http://aim.gov.in/resources-for-atl-incharge.php

4.6   ATL Adoption

Beyond the support that could be provided by external partners 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 'Unbox Tinkering' programs (See Identifying Resources and Building Capacity), 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.

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

- **Mentoring:** Partners could conduct mentoring programs during which experienced professionals could

spend time with the young innovators, helping and advising them on taking their innovative ideas forward.

• Training sessions: Partners could organize the 'Unbox Tinkering' Program (See Identifying Resources and Building Capacity) 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.

SUMMARY

This chapter highlighted the importance of continuous engagement with different stakeholders of the ATL family – students, in-charges, mentors, parents and the larger community to successfully work together and achieve the goal of ATL. It touched upon the various ATL activities conducted throughout the year and the importance of the large network of mentors that work with ATL to guide students and teachers. It also gave an overview of how AIM is engaging with the industry and academia for nurture the ATL initiative.

CHAPTER 5

Celebrate
Tinkering and Innovation

INTRO

This chapter will engage readers by describing the final phase of the ATL framework – Celebrate. It elaborates on a very important aspect of any program – recognition and celebration. For a program molding the thinking of a child from a young age, the chapter illustrates the need for highlighting the achievements of a young tinkerer who is learning how to think like an innovator, empathize with fellow citizens while overcoming his/her fear of failure with persistence.

It is said that for good ideas and true innovation, you need to have human interaction, thought exchange, debate and recognition. AIM, NITI Aayog embarked on a journey to create a vibrant hands-on learning environment for students across the country and equip them with 21st century skills through ATL.

In this journey, AIM seeks to not only celebrate the 'eureka' moments of the hard-working young student innovators but also celebrate the victory of the unsung heroes such as teachers, mentors, parents and community members who have contributed to their success.

5.1   ATL Wall of Fame

AIM, NITI Aayog initiated the ATL Wall of fame (aim.gov.in), a recognition platform for the students, teachers and mentors by celebrating and recognizing them along with providing exiting rewards & opportunities.

5.2   Recognition

1.   Exemplary Teachers of Change

To share and celebrate the exceptional work done by the ATL in-charges and to give them recognition for their efforts a 'Exemplary Teachers of Change' book is published twice a year. This book has inspiring quotes and messages from top performing ATL in-charges to serve as an inspiration for others across India.

https://aim.gov.in/pdf/ATL_Teacher_of_
change_book.pdf

Celebrate Tinkering
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2.   Gems of Mentor India

To share and celebrate the exceptional work done by the Mentors of Change and to give them recognition for their efforts a 'Gems of mentor India' is published twice a year. This book has details of the top performing RMoCs and EMoCs and their mentoring stories.

https://www.aim.gov.in/pdf/Gems_of_mentor_india.pdf

3.   ATLs of the month

Schools and ATL In-charges have to take on the additional responsibilities over and above their regular school hours and subjects to engage students, allow them tinker freely, learn new technologies themselves and adopt a new teaching pedagogy. To recognize their effort and engagement with ATL via the MyATL Dashboard, AIM announces the list of ATLs of the Month from each state of India. Through this initiative, AIM also wishes to emphasize the importance of regularly and accurately filling the MyATL Dashboard (See MyATL Dashboard under Quality Measurement of ATL) which is the primary source for AIM to know the best practices being followed across ATLs in India and their level of engagement and activity.

The list of schools is announced on the 7th of every month on AIM's website and social media.

4.   Top Mentors of the Month

The Top Mentors for each month are identified based on the mentoring session reports that mentors submit on the Innonet portal. AIM recognizes Top MoCs on a monthly basis, and the list is broadcasted on AIM social media channels.

Spotlight Story #9: Leveraging Social Media to Drive Innovation

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

Various schools such as Hansraj Model School, Kulachi, Doon Public School, New Delhi and St. Paul's School, Hubli leverage their social media pages to share vital information with the community such as participation in competitions, sessions with mentors, awards etc.
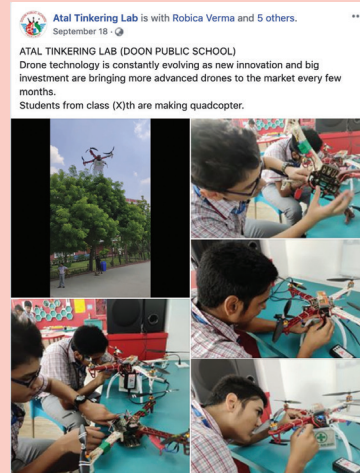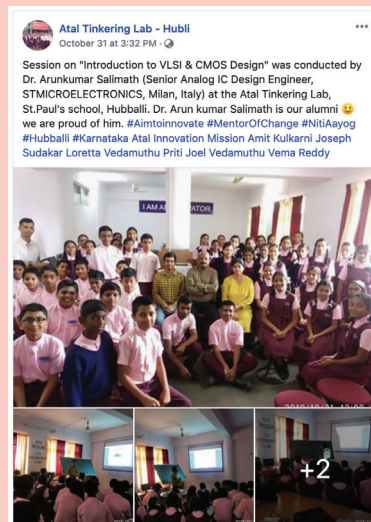
5.3 Celebration

1. Social media stories

AIM, NITI Aayog encourages all students, teachers and mentors to post their innovation stories on social media platforms, which are then shared by AIM, NITI Aayog. 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.

5.4   Opportunity

1.   Mentor India Round Table

Every six months, NITI Aayog organizes a Mentor India Round Table with CEO, NITI Aayog to honour the work done by Exemplary Mentors of Change (EMoC). The objective of the Round Table is to recognize the efforts of Mentors in building an ecosystem of innovation and entrepreneurship in India and to discuss challenges faced by the Mentors on ground.

2.   Student Innovator Program (SIP)

The AIM Student Innovator Program (SIP) is an initiative to build confidence in young innovators to pursue the dream of becoming a student-entrepreneur. The SIP exposes a student to world-class Incubators, experienced and excited mentors, technical resources, research, IPR and business skills. The SIP partners, mentor ingenious ATL students to take their innovation to a minimum viable product (MVP) and train them on various aspects of business and entrepreneurial skills. The program is a combination of Research-based and Project-based learning and is offered to the top teams of ATL Marathon, every year.

Further details of the program can be found on the link below:

https://aim.gov.in/pdf/ATL_SIP_Brochure.pdf
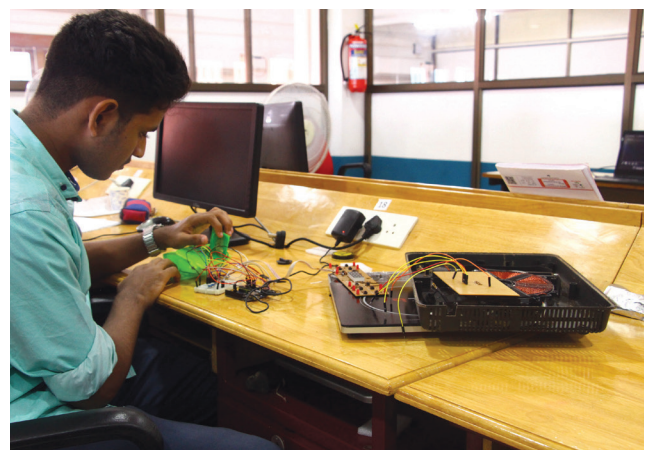
Fig 5.1 – Students participating in SIP program

3.   Student Entrepreneurship Program (SEP)

AIM has designed the Student Entrepreneurship Program (SEP), an effort to institutionalize a mechanism where top teams of the SIP (one from each focus area) can work with the corporate and industrial partners and receive further mentorship, funding for IPR, product design, and product deployment in market in collaboration with AIM's Corporate Partners.

Fig 5.2 – Students participating in SEP program

65

4.   AIM-SIRIUS Innovation Exchange Program

The AIM-SIRIUS Innovation Boot-camp is a first of its kind initiative, where high school students across two different countries of India and Russia came together to innovate and identify solutions for global challenges. This is the beginning of a new era for India and Russia's bilateral relations, and an opportunity to create an innovation exchange bridge for our youth, to equip them with globally relevant skills.

The boot-camp emphasizes on Research Based Learning (RBL) where several eminent researchers, scientists and academicians from reputed institutes with experience spanning decades in the domain, mentor students during the boot-camp.

Fig 5.3 - AIM-SIRIUS Student Innovators with Hon'ble Prime Minister of India, Shri Narendra Modi and Hon'ble President of Russia, Mr. Vladimir Putin

Fig 5.4 - Student Innovators from India and Russia with Hon'ble President of Russia, Mr. Vladimir Putin

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On the sidelines of the four-day bootcamp in 2018, 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. A video capturing the journey of the AIM-SIRIUS Innovation Festival can be viewed here:

https://www.youtube.com/watch?v=G-DEI5f-g5qo

5.   ATL Student internships

The internship program is focused on enhancing the skills of the students via various innovative activities like design thinking, developing prototypes and solutions for community issues.

During the course of this grueling and exciting internship, students learn about various technical skills such as semiconductor technology and architecture, software programming, AI, Internet of Things, Cyber Security, User interface and experience design and Blockchain.

Fig 5.5 - ATL Student Internship Felicitation at IBM, Bengaluru

6.   Participation and recognition at national and international challenges

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

Spotlight Story #10: Participating in Asia's Largest Robotics Competition, IRC Open league

School: Venkateshwar Global School, New Delhi

ATL-in-charge: Mrs. Puja Shah Dahiya

At ATLs across the country, young innovators get the opportunity to try new technologies such as Drone Technology and Robotics. A team of four students of Venkateshwar Global School (Nischal Wadhwa, Utkarsh Agarwal, Krrish Yadav and Samarth Bhutani), New Delhi, recently participated in Asia's Largest Robotics competition, IRC Open League and secured the first position. The students designed two robots: manual and automated. The manual robot can quickly move an object or a number of objects either by grabbing or dragging from one place to another. The compact autonomous robot can follow a black line, place blocks in the drop area and stop at the required location. Similarly, a team of two students, Pranav Bharadwaj and Navnoor Singh, participated in 'Synergy', a national drone competition organised by SGD University and won Rs. 10,000 cash prize.

The ATL incharge noted, "Atal Tinkering Lab has helped us foster innovation in young students. Our students had read about such technologies but it was the hands-on learning experience that helped them think out of the box."

"

Spotlight Story #11: ATL School of the Month selected for India International Science Festival

School: Excel Public School, Mysuru

ATL-in-charge: Mrs. Lekha Nair S

Excel Public School has been winning laurels by being actively involved in the various initiatives of AIM. The school was awarded ATL School of the Month twice in the last six months. Eighteen students and two teachers from Excel Public School's ATL were recently invited to be a part of India International Science Festival. The aim is to engage the public with Science and show the ways how Science, Technology, Engineering and Mathematics (STEM) provide us with the solutions to improve our lives.

Ministry of Science and Technology and Ministry of Earth Sciences in association with Vijnana Bharati (VIBHA), has created a unique platform of India International Science Festival which intends to inspire curiosity and make learning more rewarding.

As part of their preparation to attend this annual event, the selected students visited the Koorgalli Gram Panchayat and interacted with the officials to understand the immediate needs and the development programmes for the village, as this Fest is also linked to the Pradhan Mantri Sansad Adarsh Gram Yojana.

"

Celebrate Tinkering and Innovation

SUMMARY

This chapter highlighted the importance of recognition and celebration of each stakeholder that is driving the innovation journey in their community. It enlisted the various platforms created by AIM to celebrate the young tinkerers, their ATL in-charges as well as the mentors who are working diligently to realize the vision of AIM.

CHAPTER **6**

Conclusion

The ATL program design and implementation follows a plug and play approach and includes standard guidelines, curriculum, training tools, standard operating procedures (SOP) and is supported by a robust IT system and several partnerships. It enables the creation of a culture of innovation and a vibrant collaborative ecosystem within the school community, through celebration and recognition of innovative students, teachers, mentors, parents and other stakeholders.

Adopting a long-term outcome-based approach 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 are taken as and when needed.

The below Fig 6.1 highlights the inputs or resources deployed towards ATL from AIM to produce a measurable output which leads to a change or outcome that was generated because of the program and eventually creates a long-term and indirect impact.
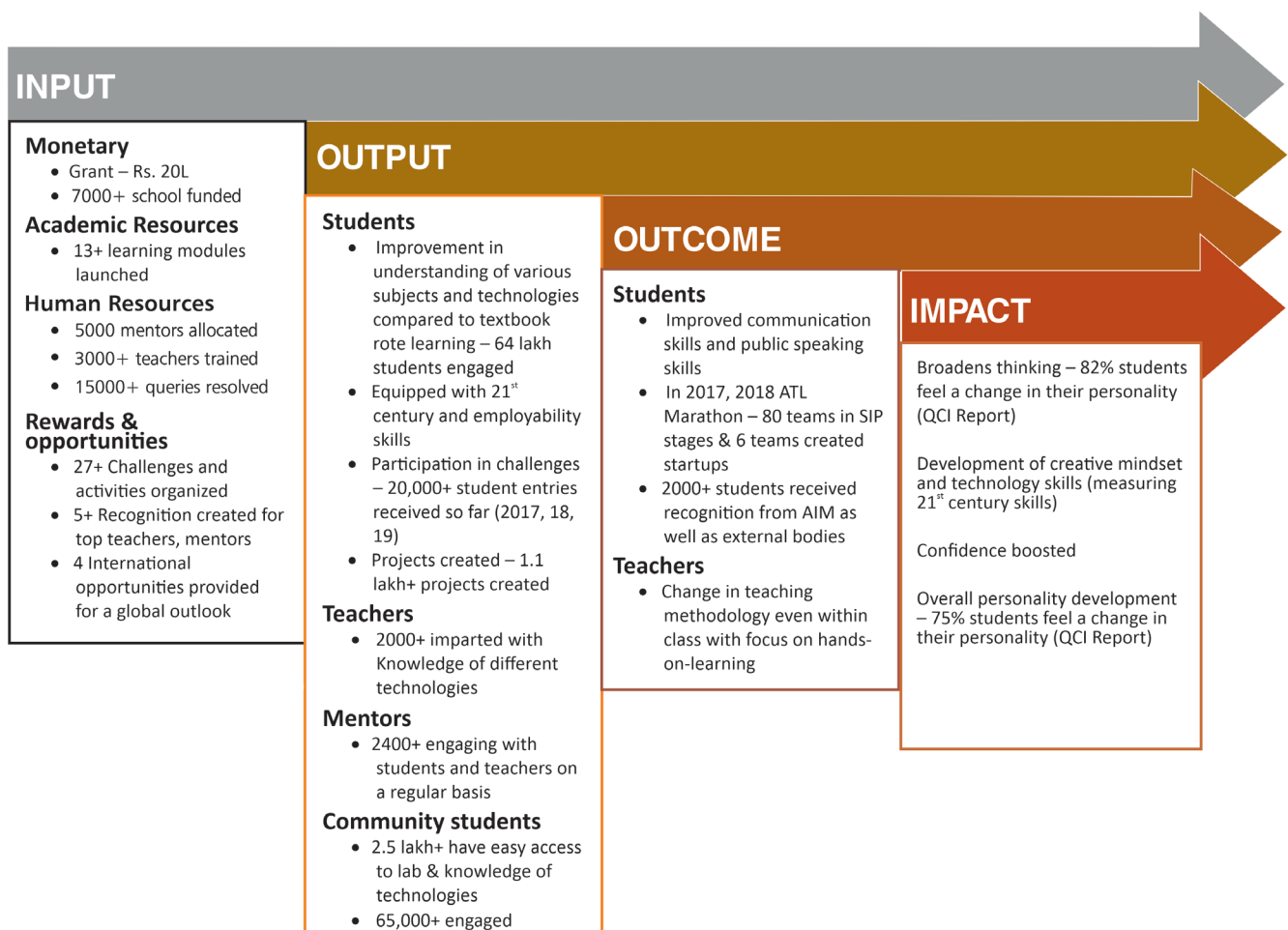
INPUT

Monetary
- Grant – Rs. 20L
- 7000+ school funded

Academic Resources
- 13+ learning modules launched

Human Resources
- 5000 mentors allocated
- 3000+ teachers trained
- 15000+ queries resolved

Rewards & opportunities
- 27+ Challenges and activities organized
- 5+ Recognition created for top teachers, mentors
- 4 International opportunities provided for a global outlook

OUTPUT

Students
- Improvement in understanding of various subjects and technologies compared to textbook rote learning – 64 lakh students engaged
- Equipped with 21st century and employability skills
- Participation in challenges – 20,000+ student entries received so far (2017, 18, 19)
- Projects created – 1.1 lakh+ projects created

Teachers
- 2000+ imparted with Knowledge of different technologies

Mentors
- 2400+ engaging with students and teachers on a regular basis

Community students
- 2.5 lakh+ have easy access to lab & knowledge of technologies
- 65,000+ engaged

OUTCOME

Students
- Improved communication skills and public speaking skills
- In 2017, 2018 ATL Marathon – 80 teams in SIP stages & 6 teams created startups
- 2000+ students received recognition from AIM as well as external bodies

Teachers
- Change in teaching methodology even within class with focus on hands-on-learning

IMPACT

Broadens thinking – 82% students feel a change in their personality (QCI Report)

Development of creative mindset and technology skills (measuring 21st century skills)

Confidence boosted

Overall personality development – 75% students feel a change in their personality (QCI Report)

Fig 6.1 – Illustration of Input, Output, Outcome, Impact framework for the ATL program

ATLs in the last 3 years have created an environment for young students to think freely, innovate and be the problem solvers for their community. The transformation of mindsets, of teaching pedagogy, of learning and doing as a whole within ATLs is what AIM considers as the eventual impact that will be created by the ATL program.

Going forward, there is a need to continuously assess and review the efficacy of the program to:

1. Understand the quality and functional performance metrics of operational ATLs

2. Compare various subjective and objective parameters of the school, students and ecosystem, prior and post establishment of ATL.

3. Improve understanding of the impact of ATL by studying short term and long-term metrics

4. Track and understand the education and career journey of ATL students

5. Track the change in mindset of ATL in-charges and teachers working in ATL schools.

6. Understand the impact on community post the introduction of the ATL program

To truly incorporate innovation within Education system of India, it is imperative to also parallelly develop an ecosystem of industry – academia linkage to foster relevant public-private engagements to ensure sustainability and dedicate resources to build a network of highly motivated and passionate teachers & mentors.

AIM, NITI Aayog and the Government of India will continue to work with dedication and vigor towards ensuring the success of the first of its kind initiative to nurture innovation within the children of India – The Atal Tinkering Labs.

LIST OF AIM PARTNERS

LIST OF ATAL INCUBATION CENTRES

Happy Tinkering 🙂