AN EXPLORATORY STUDY OF ATAL TINKERING LABS UNDER ATAL INNOVATION MISSION WITH SPECIAL REFERENCE TO NEP2020

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Abstract

In the modern times, education ought to possess an aspect, facilitating individuals to explore more and secure a means of substance or ensure sufficient resources to lead a prosperous and contented life. This exploratory study aims to investigate the impact and effectiveness of Atal Tinkering Labs (ATLs) constructed under the Atal Innovation Mission (AIM) in fostering creativity, innovation, and skill development among students. Additionally, the research explores the alignment of ATLs with the objectives and principles outlined in the National Education Policy (NEP) 2020. The study utilizes a mixed-method approach, combining qualitative and quantitative data collection methods, to gain comprehensive insights into the functioning and outcomes of ATLs. ATLs provide exclusive environment for students in grade 6 through 12 to acquire innovative skills and cultivate ideas that have the potential to revolutionize India. These labs are equipped with cutting – edge resources, including 3D printers, robotics and electronic development tools, to empower students learning experiences. The population of the study200 students enrolled in class 6- class 12 of Rajkiya Pratibha Vikas Vidyalaya, Yamuna Vihar, Delhi -110053 of academic session2022-2023.A sample of 120 students was taken through random sampling. The discoveries from this preliminary investigation are anticipated to offer valuable understanding into the efficacy of Atal Tinkering Labs and their contribution to fostering students' creativity, innovation, and skill enhancement. Furthermore, the study is expected to establish a link between ATLs and the National Education Policy (NEP) 2020, demonstrating their alignment with the policy's aim to revolutionize the educational system for comprehensive development and innovation-centered learning. The results of this research could provide guidance to policymakers, educators, and stakeholders in enhancing the influence of ATLs within the realm of education.

Keywords: *Atal Tinkering Labs, Atal Innovation Mission, National Policy 2020, interconnection between ATL and entrepreneurship.*

Introduction

At the core of economic growth and the generation of employment lies innovation. It can transform productivity and efficiency and address other world's emerging challenges, such as climate change, sustainable development, health, education, and social inclusiveness.

Creating a climate of innovation is necessary for a country to survive the current global challenges. Keeping this in mind, several initiatives like Start-up India, Make in India, Skill India and Atal Innovation Mission were started by India. The Atal Innovation Mission comprises Atal Tinkering Labs operating at the school level and Atal Incubation Centers functioning at the university level.

The objective of Atal Tinkering Labs is to nurture a million young minds in India as future-oriented innovators. The Atal Innovation Mission (AIM), operated by India's think tank NITI Aayog, has set up a series of 'Atal Tinkering Labs' (ATLs) across the country. These labs aim to promote a STEM-focused education system by nurturing qualities like curiosity, creativity, a scientific mindset, critical thinking, and innovation among young minds.

These labs are equipped to introduce students to cutting-edge tools like 3D printers, Robotics & Electronics Development Tools, loT & Sensors, aiming to nurture their innovation skills and cultivate ideas with the potential to revolutionize India. The activities within the labs are strategically crafted to not only kindle the flames of creativity but also extend beyond the confines of traditional curricula and textbook knowledge. The labs offer a flexible environment where students have the freedom to pursue their interests. This fosters the exploration of futuristic skills such as design thinking, Computational Thinking, Adaptive Learning, and Artificial Intelligence.

To cultivate innovation among students, Atal Tinkering Labs (ATLs) organize a diverse array of activities. These include regional and national competitions, exhibitions, and workshops focusing on problem-solving, product design, and fabrication, as well as lecture series. These initiatives are held at regular intervals, contributing to the development of essential problem-solving skills in the context of the contemporary technology era.

Technology stack, Tinkerly, Robot-lab, Tech -B and other platforms developed by the government and external agencies have helped set up over 9,800 Atal Tinkering Labs in India in public-private partnership mode. Schools are provided with 20 lakhs for this (12 lakhs to set-up and maintain the lab in the first year and rest 8 lakhs in installments of 2-2 lakhs over four years). NITI Aayog has created a manual for 'Atal Tinkering Labs' that lists the tools and technologies to be made available in the labs.

These tinkerers can graduate into innovators if their ideas help in the solution of real-life problems. Its objective is to provide a platform for promotion of world-class innovation hubs, grand challenges, start-up businesses and other self-employment activities, particularly in technology driven areas like in latest emerging technologies such as electronics, Io' (Internet of Things),3Dprinting,Robotics,etc.

The National Education Policy (2020), led by the Ministry of Education, emphasizes the significance of enabling children to not only acquire knowledge but, more crucially, to understand the process of learning itself. The policy underscores the shift in education towards equipping students with skills in critical thinking, effective problem-solving, fostering creativity across disciplines, and nurturing abilities in innovation, adaptability, and assimilation of information in emerging and dynamic fields. Atal Tinkering Labs are fulfilling this purpose by developing children critical thinking and problem-solvingskills. The Labs seem to align with the goals of the national policy 2020.

Objectives:

1) To study Atal Tinkering Labs as an innovative initiative to foster creativity.
2) To analyze working of Atal Tinkering Labs.
3) To find out the progress of the labs on the skills of the students.
4) To study the relationship between NEP 2020 and ATLs.
5) To explore the interconnection between ATL and entrepreneurship.

Hypothesis:

1) Atal Tinkering Labs is a new initiative for the school system.
2) ATLs are fostering creativity and analytical ability in school children.
3) Opportunities are being provided to children to try their hands at 21st century technologies in ATLs
4) Students are getting flexibility to learn at ATLs
5) The establishment of ATLs is aligned with the national ambition to rank among the world's most innovative nations.

Methodology

The methodology of this research work comprises population, sample and tool.

Population:

The population of the research paper will be around 200 students enrolled in class 6-class 12 of Rajkiya Pratibha Vikas Vidyalaya, Yamuna Vihar, Delhi -110053 of academic session 2022-2023.

Sample:

The sampling of data will be done using a simple and purposive sampling method. Out of 200 students, 120 will be selected by random sampling while for interview purposive sampling will be done.

Tools

- To accomplish this goal, an observation approach will also be employed to assess the influence of ATLs on fostering innovation.
- To achieve objective second, questionnaires comprising closed and open ended questions will be used.
- To achieve objective third, a rating scale will be developed.
- To achieve objective fourth, a checklist will be used.
- To achieve objective fifth, documentary analysis will be done.

Data Collection:

During this research data was derived from primary and secondary sources which was be further classified into numerical and descriptive data.

Questionnaire, interview, checklist, creativity test and rating scale were used to collect primary data. These tools was developed for the students and transmitted to them digitally and physically. Secondary data was collected by journals, government reports, articles, manuals, brochures government websites, archives. Newspapers, videos and documentaries.

Data Analysis -

Information gathered from diverse sources or samples using a range of methodologies and instruments typically consists of numerical data, descriptive explanations, reactions to open-ended inquiries, excerpts, field observations, and more. These collected details are categorized into two main types: quantitative data and qualitative data.

Numerical information is gathered through the application of diverse scales or assessments. Personal insights are condensed into standardized answers that are assigned numerical values. These data typically involve limited options and lack comprehensive intricacies. Quantitative data are classified as either parametric or non-parametric. Parametric data pertain to measurements on interval or ratio scales, such as the test scores of students. Conversely, non-parametric data stem from the utilization of nominal or ordinal measurement scales.

Quantitative data is collected through the utilization of diverse scales or assessments. People's perspectives are captured through predefined responses that are associated with numerical values. These data are characterized by being close-ended and often lack in-depth insights and intricacies. Quantitative data can be classified into two categories: parametric and non-parametric. Parametric data encompasses measurements obtained on interval or ratio scales. For instance, the scores achieved by students in an exam constitute parametric data. On the other hand, non-parametric data emerges from the application of nominal or ordinal scales of measurement-

- Measure of central tendency Mean, Median and Mode will be use
- Measure of relationship, inferential or sampling statistic will use T and F test Research Result and Findings:

1) Atal Tinkering Labs (ATLs) as an Innovative Initiative:

The research reveals that Atal Tinkering Labs are indeed an innovative initiative aimed at fostering creativity and innovation among students. These labs were established as a component of the Indian government's Atal Innovation Mission (AIM), the aim is to foster a culture of scientific curiosity, innovation, and entrepreneurial spirit among the younger generation.

Table – Innovative initiative started by Atal Tinkering Labs

Variable	Percentage
students present their ideas, articulate the problem	2%
integrates knowledge and techniques from various fields	70%
originality and creativity displayed in the innovation	50%
practicality and usability in real-life situations	89%

These variables can vary depending on the specific criteria set by the organizers or judges of the Atal Tinkering Labs' innovation competitions. The primary focus is generally on nurturing creativity, problem-solving skills, and an entrepreneurial mindset among students.

These labs put a positive impact on the practicality and usability in real –life situations of students. Secondly these labs promoting cross-disciplinary learning and thinking in students. Thirdly, Innovations that introduce novel approaches or solutions to problems are highly valued but it lacks in the articulation of new ideas in students.

2) Working of Atal Tinkering Labs:

The analysis of the working of Atal Tinkering Labs demonstrates that they provide a well-equipped and conducive environment for students to explore their creativity and problem-solving skills. These labs offer access to various tools, equipment, and

resources, including 3D printers, robotics kits, electronics components, etc., to help students develop hands-on technical skills.

Variable	Percentage
Support provided by mentors, teachers.	89%
Collaborations with local industries and organizations.	5%
Regional, national, or international innovation competitions.	6%
number and diversity of workshops, seminars, and events organized in the ATL	11%

The above result shows that the support provided by mentors, teachers, and experts in guiding students throughout their innovation journey is a crucial aspect of ATL effectiveness was quite good. But it is lacking in two areas, first is Collaborations with local industries and organizations which offer opportunities for students to work on real-world projects and enhance their innovation skills. And it also lacks in the participation of ATL students in regional, national, or international innovation competitions and their performances. Such events reflect the lab's impact on nurturing talent. But it is still improving in the number and diversity of workshops, seminars, and events organized in the ATL lab's .Efforts to expose students to various domains and emerging technologies is still needs improvements.

3) Progress of the Labs on Student Skills:

The findings indicate that Atal Tinkering Labs have positively impacted the skills of students. By engaging in various projects and activities within these labs, students have shown improvement in critical thinking, problem-solving abilities, communication skills, and teamwork. Moreover, they have also demonstrated a greater inclination towards innovation and entrepreneurship.

Variable	Percentage
Improvement in critical thinking,	69%
Problem-solving abilities improvement,	55%
Communication skills enhancement	61%
Teamwork	51%

According to the data, it is evident that these labs are doing great work in the enhancement of students' skills by critical thinking improvement, Problem-solving abilities improvement, Communication skills enhancement and team work.

4) Relationship between NEP 2020 and ATLs:

The relationship between NEP 2020 and ATLs can be checked based on their alignment with the broader aims and purposes set forth in NEP 2020.

Variable	Percentage
Emphasis on Practical Learning:	89%
Focus on STEM Education	91%
Bridging the Gap between Education and Industry	61%

NEP 2020 encourages a shift from rote learning to experiential and practical learning. ATLs provide a hands-on learning environment for students, where they can work on projects, experiments, and innovations, thereby promoting experiential learning. The New Education Policy (NEP) of 2020 underscores the significance of Science, Technology, Engineering, and Mathematics (STEM) education. Atal Tinkering Labs (ATLs) frequently center their efforts around activities linked to STEM, fostering enthusiasm and expertise in these domains. NEP 2020 strives to narrow the divide between academic learning and industry demands by emphasizing skill enhancement and vocational education. ATLs present an opportunity for students to delve into practical uses of their knowledge, fostering collaboration with various industries.

The research highlights a strong relationship between the National Education Policy 2020 (NEP 2020) and Atal Tinkering Labs. The NEP 2020 emphasizes the integration of experiential learning, vocational training, and practical skill development into the curriculum. ATLs align perfectly with these objectives by providing students with hands-on learning experiences, promoting creativity, and fostering an entrepreneurial mindset.

5) Interconnection between ATL and Entrepreneurship:

The study reveals a significant interconnection between Atal Tinkering Labs and entrepreneurship.

Variable	Percentage
Project-Based Learning	60%
Incubation Support:	51%

By engaging in innovation projects and learning-by-doing experiences, students develop an entrepreneurial mindset from an early age. They are encouraged to identify problems, design innovative solutions, and bring their ideas to life. As a result, many students who have participated in ATL activities have demonstrated a great enthusiasm in entrepreneurship and have even initiated their startups or innovative ventures. ATLs offer incubation support, helping students convert their ideas into viable products or services. Incubation support can facilitate the growth of entrepreneurial ventures initiated by students.

Conclusion:

As a detailed study about Atal Tinkering Labs set up under NITI Aayog's Atal Innovation Mission, this study will provide a comprehensive evaluation of this initiative not only in respect of students but also for the whole school system, society and nation. The ATLs focus on STEM field (science, technology, Engineering and Math's) as well as Art and Craft which can boost students' creativity and problem-solving skills.

STEM education goes beyond school subjects. It gives a skill set that governs the way we think and behave. Merging science, technology, engineering, and mathematics, STEM education helps us to solve the challenges the world faces today. AS technology advances, the high demand for innovation by science, technology. Engineering and math (STEM) professionals is at an all-time high.

With new products and resources coming out seemingly every day, a solid understanding of these subjects is key for young professionals to better prepare for their future careers. Innovation is critical to economic growth. STEM education encourages a generation of innovators who have the potential to change the world. Individuals are asked to think outside the box to solve complex world problems by creating actionable solutions. As productivity increases, more goods and services are produced, this boosts the economy. This new way of thinking can lead to higher productivity, meaning the same input generates a greater output.

This research work provides a base to understand why schools should incorporate this kind of program to provide first-hand experience to children about the latest technologies in the scientific field.

Through this initiative, students will equip themselves for the future utility of the market, society and nation. This will enable children to be problem-solvers and innovators of the future.

India which stands 46th in the World Innovation Index and wants to improve its ranking in future, this initiative might help India realizes the aim of achieving a better rank.

An exploration of the interconnection between innovation and entrepreneurship was also be undertaken meticulously by documentary analysis. The world is facing deep challenges across many fields and we definitely need innovation to deal with them. This innovation should be nurtured right from the school level to create inventive minds as envisaged through the setting up of Atal Tinkering Labs. This research proposal drawing inspiration from Atal Tinkering Labs of NITI Aayog and explore their efficacy in building a culture of innovation among children.

During this research, the area is delimited to only one government school(Class 9 to Class 12). In future, comparison could be done on the functioning of ATLs in government and private schools.

In conclusion, the research indicates that Atal Tinkering Labs got success in achieving their objectives of fostering creativity, promoting innovation, and enhancing entrepreneurship skills among students. These labs, in conjunction with the NEP 2020, played a pivotal significance in transforming the traditional education system into a more experiential and skill-oriented approach, preparing students for the challenges of the 21st-century economy. The interconnection between ATL and entrepreneurship has been instrumental in nurturing a generation of young innovators and problem solvers, who are well-equipped to make significant contributions to society and the economy.

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