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# Development Trajectory Of Educational Infrastructure in Madhya Pradesh At Secondary and Senior Secondary Education-Levels

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***Abstract:*** In India, secondary and senior secondary education levels serve as the foundation of a student's life during the transition from school to college. Quality Infrastructure is the need of the hour to ensure a holistic and interactive environment of learning. This paper attempts to plot the growth of the secondary (IXth-XIIth) education sector of Madhya Pradesh in terms of educational infrastructure development. Even though Madhya Pradesh has performed well through initiatives like the Education Guarantee Scheme (EGS), Muft Cycle Yojana, etc. However, more efforts need to be made to achieve the Sustainable Development Goal of Quality Education (UN Sustainable Development Goal 4) and its targets. Through a blend of primary and secondary data, the study aims to analyse Madhya Pradesh's growth and recommend necessary interventions. This micro-level study will help policymakers frame suitable policies to ensure 'No one is left behind.'

***Index Terms*** **- Secondary Education, Senior Secondary Education, Madhya Pradesh, Educational Infrastructure, Classrooms, Girl's Toilets, Library, Computer Lab, Science Laboratory**

## I. INTRODUCTION

Education forms the premise in determining the living standards of an individual. Literacy levels are an indispensable tool in determining the development of society. To ensure the same, the Right to Education has been explicitly guaranteed by the Constitution of India. In recent times, India has focused its growth strategies on improving its education system. India's ground-breaking National Education Policy (NEP) 2020 envisages India as the third-largest economy of the world by 2030 driven by a 'Knowledge economy'. NEP 2020 envisions educational institutions to be the temples of the new self-reliant India. To realize the hefty aspirations laid under NEP 2020, the Indian schooling system will have to undergo stringent reforms.

A school is more than a structure of brick and mortar, it's an institution where children are introduced to different pieces of knowledge, diverse subjects, diverse cultures, and orientations which ultimately help in ensuring their holistic growth as responsible citizens. When it comes to education in India, two challenges are encountered- the challenge of increasing participation, especially at the secondary level, and the challenge of improving the quality of education. While India might have been successful in ensuring constant growth in its Gross Enrolment Rate (GER), it has not been able to equip the schools with state-of-the-art infrastructural facilities. A major testament to this state is that the Union Budget of education has remained under six percent of the GDP since the past decades. Basic facilities like washrooms, drinking water, and electricity are fundamental to ensure retention rates. Facilities like libraries, computer labs, and science laboratories are vital for the holistic development of children in the 21st century.

Reforms in education can be categorized as administrative and academic. Improvement in educational infrastructural is usually a result of administrative reforms. This study attempts to focus on the development of educational infrastructural at secondary and senior secondary education levels by taking the case of Madhya Pradesh, one of the largest Indian states. This study examines the growth of educational infrastructure in Madhya Pradesh. It further recommends academic and administrative interventions to strengthen the quality of educational infrastructure in India.

## II. REVIEW OF LITERATURE

### 2.1. Education Sector of Madhya Pradesh

Situated in the heart of the nation, Madhya Pradesh is the second-largest state of India and home to 9.4 percent of India's population (Census 2011). It is one of the fastest-growing states of India, with a net annual growth rate of 11.98% in the FY 2011-2012. Still, when it comes to education, Madhya Pradesh is one of the four densely populated BIMARU (Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh) states that are together responsible for keeping India's literacy rate low. [5]

In 2017-18, Madhya Pradesh's literacy rate stood at 73.7 percent, which is 4 points less than the national average. Madhya Pradesh's literacy rate also revealed a wide gender gap with female literacy rate as low as 65.5 percent and male literacy rate at 81.2 percent, both below the national average.[10] Keeping secondary and senior secondary education levels in perspective, Madhya Pradesh has roughly 6.4 million children between the ages of 13 to 17 who should ideally be in secondary schools. However, Madhya Pradesh's performance has remained subpar, as indicated by its Gross Enrolment Rate (GER) of 75.5 and 51.42 at the secondary and senior secondary levels, respectively.[4]

GER in Madhya Pradesh has increased with time, however, multiple factors, including poor infrastructure, lack of access to toilets, the excessive distance between school and home, lack of qualified teachers, etc., keep the GER low, especially at the secondary and senior secondary levels of education. Poor and inadequate educational infrastructure directly adds to lower GER.

When it comes to the number of secondary and senior schools in Madhya Pradesh, the numbers have been increasing from 15,314 schools in 2015-16 to 17,467 schools in 2018-19. However, an interesting scenario can be noted in Madhya Pradesh. While the number of schools has increased, the number of classrooms in the state decreased by 15 percent since 2016-17. The number of classrooms in urban areas has witnessed a drop of twenty percent from 2016-17 to 2017-18. Therefore, it can be substantiated that with the increasing number of schools and decreasing number of classrooms, the number of students in each classroom is increasing directly hitting the Pupil-Teacher Ratio. Notably, the total number of secondary classrooms in Madhya Pradesh comprises only six percent of the sum secondary classrooms in India. [5]

### 2.2. Educational Infrastructure in Madhya Pradesh vis-à-vis the Other Indian States

Presently, Indian schools have less than fifty percent coverage of integrated science labs at the secondary level and in Madhya Pradesh, the rate is only sixty percent. Interestingly, Chhattisgarh, a victim of left-wing extremism (LWE), has a higher percentage of an integrated science lab than Madhya Pradesh [2]. Availability of toilet facilities has a strong relationship with the safety and security of the girl students [1]. Many girls refrain from attending school due to poor washroom facilities that force them to defecate in the open and cause menstrual health challenges. According to UDISE [4] (2019), out of the total girls' toilets in Madhya Pradesh, only 95 percent are functional, whereas states like Sikkim, Haryana, Bihar have a higher percentage of functional toilets. In the scenario of the drinking water facilities, Madhya Pradesh has a low coverage compared to poor states like Jharkhand. Madhya Pradesh allocated 18.3% of its total expenditure for education in 2020-21. This is higher than the average expenditure (15.9%) allocated for education by states (PRS, 2019-20 BE). Even though the expenditure was increased, it was not translated into effective ground-level implementation. Further, the onset of the coronavirus pandemic led to a precarious situation in the education model due to the shift to online learning. According to a report by the Ministry of Education titled, 'Initiatives by the school education sector in 2020-21', the digital divide in Madhya Pradesh was the highest at 70 percent, resulting in a learning loss.

## III. RESEARCH METHODOLOGY

### 3.1. The Objective of the Study

The objectives of the study are *(A.)* To empirically analyze the growth of educational infrastructure at the secondary (classes XI-X) and the senior secondary (classes XI-XII) education levels in Madhya Pradesh*; (B.)* To suggest possible policies, recommendations, and innovations to improve the educational infrastructure at the secondary and the senior secondary education levels in Madhya Pradesh.

### 3.2. Primary Data

Primary data was collected using a random sampling technique. A questionnaire was prepared to understand the trends of the development of educational infrastructure at the secondary and the senior secondary levels of education in Madhya Pradesh. Responses were collected from secondary and senior secondary school teachers across 16 districts of Madhya Pradesh. Telephonic conversations were held with teachers from private schools and state government-run schools in Madhya Pradesh. The study was conducted from August 2020 to October 2020.

### 3.3. Secondary Data

Information was collected from websites, government portals, reports, and sources including (a) U-DISE+, (b) Ministry of Education, (c) NITI Aayog, (d) Department of Education Madhya Pradesh, (e) National Education Policy 2020, (f) Other articles, journals, newspapers, etc.

## IV. RESULTS AND DISCUSSION

### 4.1. Availability of Electricity

In the contemporary world, life is stagnant without electricity. Yet this provision is not guaranteed in many Indian Schools. Between 2013 to 2016, the percentage of secondary and senior schools in Madhya Pradesh with electricity connections increased. However, it remained below the All-India average. Moreover, even in 2016, Madhya Pradesh's numbers were less than those registered in 2013 at the All-India level.

Table 1 Schools Having Electricity Connection (in %)

| Secondary Schools with Electricity Connection | | | |
|---|---|---|---|
| **Year** | **2013-2014** | **2014-2015** | **2015-2016** |
| Madhya Pradesh | 73.33 | 76.88 | 86.21 |
| India | 86.25 | 87.80 | 92.56 |
| **Senior Secondary Schools with Electricity Connection** | | | |
| Madhya Pradesh | 83.27 | 86.21 | 87.88 |
| India | 91.56 | 92.56 | 92.88 |

Source: UDISE [4]

In 2016, at the secondary level, Madhya Pradesh's numbers (86.21 percent) were less than those registered in 2013 at the All-India level (86.25 percent). At the senior secondary level, 87.88 percent of schools in Madhya Pradesh had an electricity connection when the All-India percentage was 92.88. Importantly, just having an electricity connection is not enough if a regular supply of electricity is not guaranteed. In a random sampling survey, an attempt was made to study the number of hours electricity is available in secondary and senior secondary schools in Madhya Pradesh.

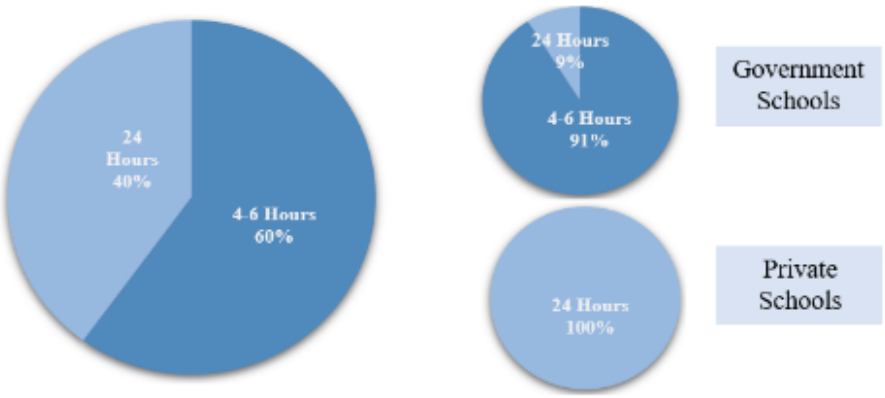



**Figure 1** Number of Hours Electricity is Available in Secondary and Senior Secondary Schools of Madhya Pradesh

All the surveyed schools had an electricity connection. However, there existed a difference in the number of hours these schools received electricity. While all private schools had around-the-clock electricity supply, only 9 percent of the surveyed state government schools had the same. The remaining state government schools received electricity between 4-6 hours a day only.

According to the data published by UDISE+ in 2017-18, Madhya Pradesh continued to underperform as compared to the national average since only 86.6 percent of the schools had an electricity connection against the national average of 91.8 percent. However, the state's track record was commendable given the immense headway it has made in both rural and urban electrification of schools. Electrification in schools of urban areas has progressed from 86 to 96 percent. And in rural areas, it has leaped from 51 to 80 percent. Still, as claimed by the respondents, the availability of electricity isn't around the clock despite electrification.

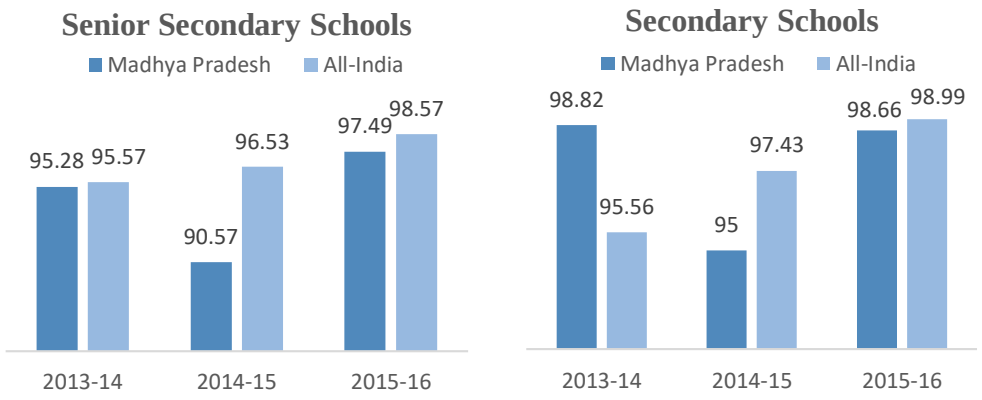
### 4.2. Availability of Girls' Toilets

Poor school sanitation facilities have been cited as a factor that can push children, particularly girls, out of school at the secondary level of schooling. [7] At this stage, females enter the menstruation age, which can serve as a reason for their absenteeism and/or dropout. It can serve as both, a;

Pull-out factor, when girls do not attend school because of menstrual pain or family/cultural expectations to stay home, or where menarche leads to early sex, pregnancy, and/or marriage; or

Push-out factor, whereby girls avoid or miss school because of inadequate facilities to manage their menstruation.

Thus, the provision of separate functional toilets for boys and girls in high schools has become imperative to prevent female dropouts due to the above-mentioned push-out factor. Moreover, this will further encourage families to move past societal taboos and not pull-out girls from schools.




Source: MHRD

**Figure 2** Schools Having Access to Girls' Toilets

A glance at the data presented by MHRD highlights the availability of Girls' Toilets in schools. The availability of girls' toilets in secondary and senior secondary schools in Madhya Pradesh increased in the years between 2013 to 2016. Moreover, the state lagged only marginally as compared to the all-India average in the same years. In 2014-2015, Madhya Pradesh saw a dip in the number of Girls' Toilets. However, the numbers increased in the following years.

In a random sampling survey, an attempt was made to study the on-ground presence of separate toilets in schools across Madhya Pradesh. The findings are as follows.

Table **2** Availability of Separate Toilets for Boys and Girls in Secondary and Senior Schools (in %)

| S. no | Category of School | Yes | No |
|---|---|---|---|
| 1 | Private (34%) | 100 | - |
| 2 | State Government (66%) | 94 | 6 |
| 3 | Total | 96 | 4 |

From table 2, it can be inferred that all the private schools had access to separate toilets, while 6 out of every 100 state-government schools lacked this provision. However, it was informed by the state-government school teachers that even though separate toilets are present, their functionality is not guaranteed owing to poor water supply and poor infrastructure inside the toilets.

As girls hit puberty, separate toilets become a prerequisite to promote education at the secondary and the senior secondary levels. However, just building toilets is not enough if a proper water supply is not ensured. Even though nearly 100 percent of schools in Madhya Pradesh had water facilities yet a 24*7 water supply is not guaranteed. Poor water supply nullifies the presence of separate toilets and thus serves as a reason for female dropouts.

### 4.3. Availability of Computer Lab

The accessibility of modern computer technologies in schools is increasing all over the globe. Generally, the presence of a well-equipped and functional computer lab facility in school provides the opportunity not only to modernize educational methods but also to augment students' and teachers' interest in the efficient use of computer technology along with access to quality education. The role of the internet has become indispensable in imparting and gaining knowledge [11]. Computer lab facilities in secondary and senior secondary schools open new opportunities for students, such as the possibility to learn coding, graphic designing, digital marketing, programming languages, web designing, etc. With the advent of technology, the knowledge of these skills is becoming indispensable for young people across different fields of study.

Despite the fact that the level of importance of computers and the internet have in contemporary times, such facilities remain a far-fetched dream in Indian schools. In 2019-20, less than 30 percent of the government schools in India had functional computer labs. Less than 12 percent of these schools had internet facilities, as per the data published by the Ministry of Education. The academic year 2019-20 ended with the closure of schools due to COVID-19. The severity of the lack of computer labs in government schools was realized during the pandemic when these schools failed to easily transit to digital options for imparting education. Both the government school teachers and students suffered in taking classes and attending classes, respectively. Although programs like *Har Ghar Pathshala* (Government of Himachal Pradesh) have proved to be effective during the pandemic, there exists an urgent need to improve the Information and Communications Technology (ICT) infrastructure in schools.

Table 3 Availability of Computer Lab in Schools in Madhya Pradesh (in %)

| S. no | Category of School | Yes | No |
|---|---|---|---|
| 1 | Private (37%) | 100 | - |
| 2 | State Government (63%) | 45 | 55 |
| 3 | Total | 65 | 35 |

As per UDISE+, over one-third of the secondary and senior secondary schools in Madhya Pradesh lack the provision of computer labs. Further, a random sampling survey was conducted to check the availability of computer labs in secondary and senior secondary schools in Madhya Pradesh. Table 3 reflects upon the availability of computer labs in schools in Madhya Pradesh. While 100 percent of private schools had proper functional computer labs, about 55 percent of the state government schools did not. The remaining 45 percent of the state government schools had computer labs; however, it is important to note that the actual functionality of these labs is in question even in these schools. While the computer labs were present, their availability to students, the presence of proper equipment and computer teachers, etc., is not guaranteed, as reported by the respondents.

### 4.4. Availability of Library

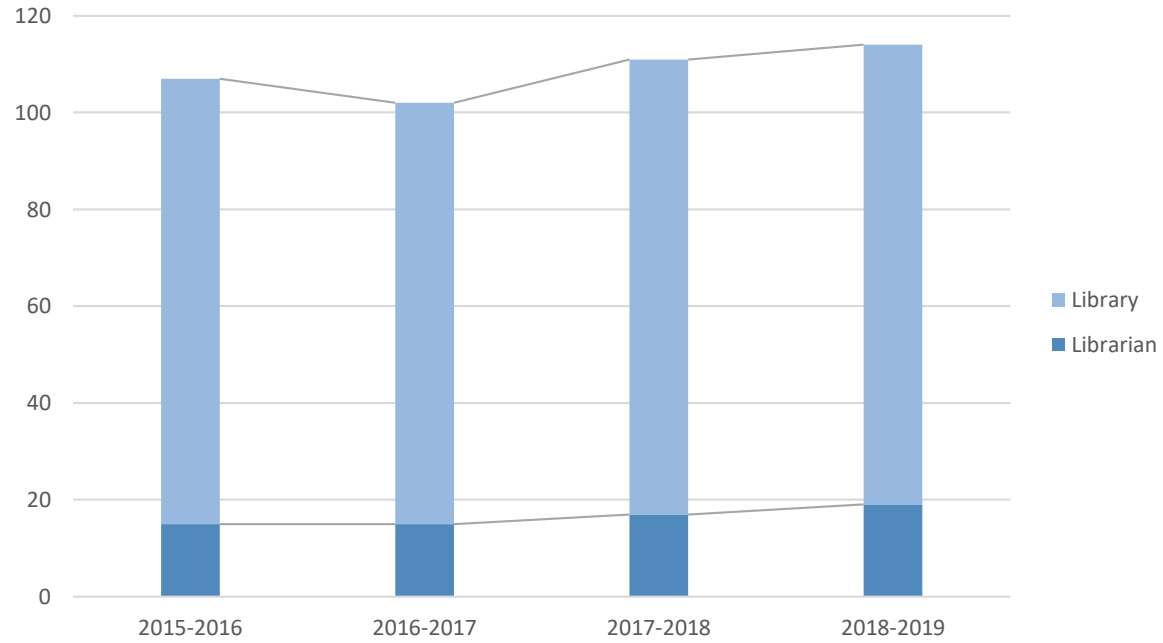
The library is more than an abode of books, it plays a central role in the holistic development of the children by exposing them to knowledge beyond the contours of their curriculum. Another objective of the library is to encourage children to view the world from their own perspective.[6] A library can help in inculcating reading habits among children at an early age and instill the desire to learn more about various domains. Further, it can also help the children in recognizing their interest in pursuing a graduate degree. By inculcating the habit of readership, the country can build an informed, critical future citizenry. Interestingly, the National Curriculum Framework (NCF) 2005 also suggests, 'The school library should be conceptualized as an intellectual space where teachers, children, and members of the community can expect to find the means to deepen their knowledge and imagination.

In a random sampling survey, secondary and senior secondary school teachers of Madhya Pradesh were asked about the presence of a library in the schools they taught in. The following inferences were made from the data collected.

Table 4 Availability of Library in Schools in Madhya Pradesh (in %)

| S. no | Category of School | Yes | No |
|---|---|---|---|
| 1 | Private (35%) | 100 | - |
| 2 | State Government (65%) | 55 | 45 |
| 3 | Total | 71 | 29 |

Out of all the surveyed schools, 29 percent did not have the provision of a library. Notably, all the schools without a library were state government schools. It was also pointed out by the teachers from the state government schools that although a library is present in the school premises, oftentimes it is inaccessible to the students, lacks a proper librarian, or does not have useable books.




Source: UDISE [4]

**Figure 3** Availability of Libraries and Librarians in Secondary and Senior Secondary Schools of Madhya Pradesh (in %)

According to UDISE [4], the number of schools with libraries remains above 90 percent (between 2015 to 2019). However, not even 20 percent of these libraries had librarians. Notably, the number of libraries and librarians has grown over the years, yet the situation remains grave. The lack of librarians in the libraries nullifies their infrastructural presence. Therefore, even though in 2018-2019, 95 percent of the schools had libraries, a very small number of students had access to them because of the lack of other complementary requirements.

### 4.5. Availability of Science Laboratory

Science comes hand in hand with practical experiments. A student can relate to the text in a better manner when he/she can witness the practicality of the theories. The importance of science can be substantiated by the provision of the National Education Policy 2020,

which emphasizes a 'learning by doing' approach. For instance, in physics, labs play a very active and significant role. It is essential to develop concepts and principles because students are continuously required to identify the hidden concepts, define and explain underlying laws and theories using high-level reasoning skills. It is time and again observed that traditional real-time physics laboratory has some limitations and problems in developing these concepts etc. In the present given scenario of ICT, virtual lab through computer simulation-based method of teaching physics is emerging as one of the most powerful methods of experimentation in the lab.[8]

In the wake of the COVID-19 induced learning difficulties, the above approach can help in ensuring safe learning from the boundaries of home, reduce additional infrastructural costs of the government and provide uninterrupted access to lab facilities to the students. However, it needs to be substantiated that physical lab cannot be excused since the ICT diffusion level is currently lower in states like Assam, Bihar, Madhya Pradesh, and Uttar Pradesh.[9]

Table 5 Availability of Science Lab in Schools (in %)

| S. no | Category of School | Yes | No |
|---|---|---|---|
| 1 | Private (35%) | 100 | - |
| 2 | State Government (65%) | 61 | 39 |
| 3 | Total | 75 | 25 |

Table 5 highlights the availability of science labs in schools. About 75 percent of the total surveyed schools had access to science labs. However, the remaining 25 percent didn't. It is important to note that all the schools without the provision of science labs were state-government schools. About 39 percent of the total state-government schools surveyed did not have such labs. It was also reported by the respondents that the presence of lab assistance, proper equipment, etc. was not guaranteed in the science labs present in state-government schools. It was also mentioned that many schools have benefitted from the application of the Atal Tinkering Laboratories scheme by Niti Aayog, providing a scientific workplace to students in schools.

### 4.6. Availability of Drinking-Water

Clean drinking water is a prerequisite for a healthy being. Even though this provision is present in most of the high schools in Madhya Pradesh, the quality of water provided is still under scrutiny. Table 6 sheds light on the availability of drinking water in state-government schools and private schools across Madhya Pradesh.

Table 6 Availability of Drinking Water in Schools (in %)

| S. no | Category of School | Yes | No |
|---|---|---|---|
| 1 | Private (34%) | 100 | - |
| 2 | State Government (66%) | 97 | 3 |
| 3 | Total | 98 | 2 |

According to Table 6, two out of every hundred schools did not have access to drinking water. While all the private schools had proper access to drinking water, 3 percent of the total state-government schools did not. The respondents also informed that tap facilities were marginal in state-government schools. Hard water (via handpumps) was used for drinking and cleaning purposes. These handpumps posed restrictions like reduced water flow in winters, provision of muddy water, and lack of convenience.

## V. FINDINGS

Following findings can be made from the above study.

**5.1. 91 percent of the total surveyed state government schools received electricity for only 4-6 hours a day**. All the surveyed private schools received around-the-clock electricity alongside a mere 9 percent of the state government schools. Between 2013 to 2016, the percentage of secondary and senior schools in Madhya Pradesh with electricity connections increased. However, it remained below the All-India average.

**5.2.** According to the survey, all the private schools had access to separate toilets, **while 6 out of every 100 state-government schools lacked this provision.** However, it was informed by the state-government school teachers that even though separate toilets are present, their functionality was not guaranteed because of poor water supply and poor infrastructure inside the toilets.

**5.3. About 55 percent of the surveyed state government schools did not have computer labs**. Whereas the remaining 45 percent of the observed state government schools having computer labs did not guarantee the presence of proper equipment, full-time electricity supply, and computer teachers.

**5.4. 39 percent of the surveyed state-government schools did not have science laboratories.** At the same time, most of the state government schools with existing science laboratories did not have lab assistants and adequate equipment. It was also mentioned that many schools have benefitted from the application of the Atal Tinkering Laboratories scheme by Niti Aayog, providing a scientific workplace to students in schools.

**5.5. Out of all the surveyed schools, 29 percent did not have the provision of a library.** Notably, all the schools without a

library were state government schools. It was flagged by the respondents that oftentimes, libraries in state government schools were inaccessible to the students, did not have a librarian, or did not have useable/ updated books.

## VI. RECOMMENDATIONS

Based on the aforementioned study and findings, the following recommendations can be made.

6.1. It is recommended that the District Education Officer form District Social Audit Committees (DSACs). The committee must comprise eminent educators, retired government school principals or TGT level teachers, and two members from the Gram Sabha or Municipal Corporation. The committee should carry out quarterly inspections of state government schools under its jurisdiction. The Social Audit would focus on the basic amenities in washrooms, supply of water, schooling infrastructures like desks, benches, and blackboards.

6.2. Further, it is proposed that the DSAC should place its findings in the public domain to ensure community participation in the management of schools.

6.3. It is recommended to Prepare a Teacher Report Card (TRC) to ascertain the continuous evaluation of teachers in imparting their subject knowledge. The TRC would evaluate teachers on four parameters- Regular classes, Teacher-student engagement, practical and interactive teaching, and anonymous student feedback.

6.4. It is proposed to develop a performance-based Incentives (PBI) mechanism to teachers by setting a benchmark of pass percentage/ average class result. Upon a pass percentage of 75 percent, the school administration should give occasional motivation in the form of incentives.

6.5. It is proposed that the concept of Classroom libraries be introduced wherein each classroom has a small library accessible to all the students. The students must donate at least one book each to set up the library.

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