Research

Functional integration and utilization of technologies in school education with reference to regional disparity in India

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Abstract

Technology has brought about a radical change in the field of education. Today education has been made simple and accessible to all without any economic, geographical, or psychological barriers. Due to the falling learning outcomes of Indian students over the past few decades (Annual Status of Education Report, 2023), technology was added to the field of education with great hope. The central government has provided equal facilities to every school in the country through the Sarva Shiksha Abhiyaan (2001), Right to Education (2009) to Samagra Shiksha Scheme (SSS 2018). Therefore, quality education can be provided to the students as per their need and students should have access to quality education without any barriers. However, the presented research has brought about on the basis of data from the (UDISE +) Unified District Information System for Education data (2021–22) that regional differences were found in the availability of computers and computer-related facilities and functional availability of Information & Communication Technologies' facilities in all the states of India. Along with this, differences in computers and Integrated teaching Learning Devices were also found on the basis of the type of schools across different management and across the states in India.

Keywords Technology · Integrated teaching learning devices · Regional disparity · School education

1 Introduction

"The Future is Technology, and Vice Versa" The quote has been realized not just in the field of education but also in other economies and industries globally as well as in India. Without question, we live in an era of technology and the next era will also be reliant upon it. Technology has played significant role in many facets of human life, from large and small, everyday duties to national and international endeavors, and also to the level of space monitoring. Even the most difficult tasks can be simplified using technology, saving time, money, and human efforts. Technology is the application of scientific knowledge to the practical aims of human life, or as it is sometimes phrased, to the change and manipulation of the human environment [6]. The world can be instantly changed with the help of technology on the line of increasing human needs. Over the next decade, as technology becomes more affordable, widely available, and immersive, there's no reason to believe this trend will revert [9]. With these advantages in consideration and multiple positive outcomes, technology has been integrated into the field of education.

The goal of integrating technology with education was to ensure everyone access equally to high-quality education. With the use of technology, children could efficiently receive a high-quality education with minimal human and physical resources. The innovations, technology, and fresh concepts will completely transform the globe and lead humankind into

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the future. Technology has drastically changed the educational landscape in the twenty-first century and more specifically in Post-Covid era. The conventional approach to learning has been discarded by technology. Instead of being teacher-centric, education is now learner and learning-centric. The purpose of traditional learning is to impart knowledge and the purpose of modern learning is to focus on learning desired outcomes and to make education more target oriented [3]. Due to advancements in technology, students can now learn in groups or individually depending on their personal needs and educational preferences. It gives the students an option to efficiently learn the subject matter one-on-one, one-to-many, or peer-to-peer basis. Students are now free to learn independently or through a network, online or offline, and with or without others. Technology has made a wide range of informal learning opportunities accessible to the learners [16]. Teachers and learners have benefited greatly from incorporating technology into the classroom because it decreases the need for teachers to plan lessons and provide each student with individualized attention. Students concur that digital learning is helpful, and in particular, students who use digital learning benefit from extended learning sessions that generally result in better learning outcomes [8]. Also, rather than relying solely on teachers, children increasingly learn the content creatively. Digital technology reduces the time teachers and students spend on menial tasks, the time that can be used in other educationally more meaningful activities [16].

Numerous educational initiatives were created in this sequence of offering high-quality education to make education universally available and compulsory for everyone living in a huge and diverse country like India. These initiatives include DPEP (1993–94), SSA (2000–01), RTE (2009), RMSA (2008), and now Samagra Shiksha Scheme [14]. There was a rise in student enrolment at the school education level of nearly 26.52 crore, as a result of the government's large-scale implementation of these educational initiatives as discussed above. Here, both the numbers of quantitative growth; schools around 14.89 lakh, and teachers nearly 95 lakh have been increased due to different educational initiatives by the government [17]. Educational initiatives made sure that children could receive education, but there remain concerns about the quality of education in India, especially in government schools. In the last few decades, several documents such as ASER Reports [5] along with previous reports of NCERT-NAS Report 2017 & 2021, FICCI Reports, The Hindu Survey, etc. revealed that learning outcomes in Indian schools are at a worrying level. The aforementioned documents' report invited attention to the student learning outcomes and the quality of education for all concerned parties and attempts were made to make it better. To improve student learning outcomes and provide high-quality education, a technological step was taken in the direction of education, which is also being reflected in NEP 2020 document. Samagra Shiksha Scheme guaranteed that technological equipment would always be available in all schools of the country. A budget of 6.40 lakhs (non-recurring expenditure) and 2.40 lakhs (Recurring expenditure) for ICT labs along with 2.4 lakhs (non-recurring) and 0.38 lakhs (recurring) for smart classrooms have been sanctioned to all the schools [14].

In the present research article, an effort has been made to comprehend the accessibility and functionality of technical resources, particularly computers and integrated teaching learning devices, that are available in all state-level schools across the states in India.

2 Significance of the study

The use of technology in the school education sector has been in practice for about two decades and subsequently supported by the SSA (2001), RTE (2009) and also by several state governments. However, with the initiation of Digital Initiatives under Samagra Shiksha Scheme [14] and subsequently after the Covid era, the role of technology received a major boost in teaching learning space in both formal and non-formal education sectors. The post-covid era gave rise to the innovation and affordability of technology which has been widely under practice by the education sector. The ASER [5] made a major concern about the impact of use of technology on the learning outcomes of the school students which was further elaborated in terms of both the positive impact on the techno-friendly students and the negative impact on the students who have no access or affordability of technology. But, the latest report of ASER [4] deliberated mostly upon the positive impact of technology across the types and social categories of students in the school. Therefore, it can be concluded that technology at the initial levels/years might pose challenges but with time and the provisioning of affordable technology, it heals the negativity into positivity.

Various documents, especially ASER [5] and NCERT-NAS [10, 11] 12th Five Year Plan document [1] and NEP 2020 [12] expressed concern over the continuously falling learning outcomes of students in Indian schools. Then those responsible for education found a solution to this problem in the form of educational technology and launched several schemes for this especially the Digital initiatives under the Samagra Shiksha Scheme [14]. Now the next question that arises is whether the technical equipment that is to be used in the teaching and learning process in schools are available in schools or not.

Further, if technical equipments are available in schools, then is it functional or not?. Because availability of technical equipment is not enough, but it is necessary for them to be functional in the teaching–learning process. Only then will success be achieved in improving the learning outcomes of students. Therefore, the researcher felt the need to find out the availability of technology and its status in schools.

3 Methodology of the study

Government, government-aided, and private unaided schools were chosen for the study from every state of the country whereas data of union territory was excluded from the study. Additionally, the study also did not include other categories of management schools. Elementary and secondary schools comprised the school sample in the present study. The method adopted for the present study is primarily the secondary data analysis method. The UDISE+[17] report was one of the main secondary data sources considered in the study. Percentages, Mean and average values were employed to calculate statistics analysis of the given data. The data analysis was done based on secondary available data of computer facility available and functional availability of computers and related facilities. Further, the data source also includes PC with Integrated Teaching Learning Devices. Here it is important to note that the researcher has considered availability and functional availability as more than 80% is significantly high and less than 20% as significantly low. As far as data related to PC with Integrated Teaching Learning Devices is concerned, more 10% and less 10% have been taken as a benchmark for statistical analysis. Further, the overall analysed value was presented based on the mean values of more than 10% and less than 10% of PCs with Functional Integrated Teaching Learning Devices. Here above the mean value is consider high and below mean value is considered as low. Data can be accessed through UDISE+ (2021-22).

4 Objectives of the study

The following objectives were formulated for the study-

1. To find out the availability of computer facilities in Govt., Govt. aided and private schools across states of the India.
2. To find out the functional availability of computer facilities in Govt., Govt. aided and private schools across the states of India.
3. To find out the availability of PC with Integrated Teaching Learning Devices facility in Govt., Govt. aided and private schools across states of the India.
4. To find out the functional availability of PC with Integrated Teaching Learning Devices facility in Govt., Govt. aided and private schools across the states of India.

5 Analysis, interpretations and discussion of the data

Here, the analysis of the availability of computers and computer-related facilities are being presented state-wise on the basis of their availability and functional status. Along with this, a detailed analysis of the availability and functional status of computers and computer facilities are being presented on the basis of school types. Based on UDISE+[17] data sources, the availability of computers, functional computers, and PCs with Functional Integrated Teaching Learning Devices in schools have been analysed and presented. Under Tables 1 and 3, the data of all the states has been presented in detail where the availability of computers and functional computers is more than 80% in all management types of schools. A detailed description of the types of schools, state-wise schools have also been analysed where the availability is more than 80%. Additionally, Tables 2 and 4 present the data of those states where the availability of computers and functional computers is less than 20% in all management types of schools. Along with this, details of those types of schools have been presented with the availability of less than 20%. Furthermore, Table 5 presents the details of the availability of PCs With Functional Integrated Teaching Learning Devices in those states where availability is more than 10% in all management schools. A detailed description of those management schools has been presented where its availability is less than the average. Additionally, Table 6 presents the data on the availability of PCs With Functional Integrated Teaching Learning Devices in those states where the availability is less than 10% in all management types of schools and also provides details of those management schools where the availability is less than the average.

Discover

Table 1 percentage of schools with availability of computer facility, 2021–22 (UDISE +) (Above 80%)

Sl. No	State	All management	Government	Govt. Aided	Pvt. Unaided
1	Andhra Pradesh	51.6	37.4	33.7	**95.8**
2	Chhattisgarh	**89.4**	**91.8**	52.8	76.6
3	Goa	55.3	21.7	**94.3**	**95.7**
4	Gujarat	**98**	**98.4**	**99.2**	**96.6**
5	Haryana	**93.2**	**92.6**	**87.5**	**95.2**
6	Jharkhand	**85.2**	**89**	37.5	**90.6**
7	Karnataka	56.4	40.7	78	**88.5**
8	Kerala	**98.3**	**96.2**	**99.9**	**98.6**
9	Maharashtra	**81.4**	72.3	**93.4**	**97.3**
10	Mizoram	53.5	43.2	**81.7**	71.5
11	Nagaland	57.4	45.6	0	**87.7**
12	Punjab	**99.6**	**100**	**92.4**	**99.1**
13	Rajasthan	52	36.9	0	**83.2**
14	Sikkim	**89.9**	**88.1**	73.7	**94.9**
15	Tamil Nadu	78.4	**81**	47.8	**91.1**
16	Uttarakhand	58.3	49.2	77.1	**85.3**

Source: UDISE + 2021–2022

Bold numbers are significantly high with 80% or above

Table 2 Percentage of schools with computer facility, 2021–22 (UDISE +) (Below 20%)

Sl. No	State	All management	Government	Govt. Aided	Pvt. Unaided
1	Arunachal Pradesh	34	22.7	95.6	89.3
2	Assam	**18.9**	**17.1**	**8.4**	55.3
3	Bihar	**18.9**	**9**	21.4	71.3
4	Himachal Pradesh	40.5	31.3	**0**	94.3
5	Madhya Pradesh	26	**12.4**	40	67.1
6	Manipur	37	21.5	**8.6**	93.2
7	Meghalaya	**18.3**	**11.2**	23.3	31.2
8	Odisha	26.4	**18.3**	33.6	77.5
9	Telangana	42.9	27.6	37.6	81.1
10	Tripura	32.6	28.8	74.4	81.1
11	Uttar Pradesh	27	**8.1**	55.8	51.2
12	West Bengal	**18.4**	**16**	61.4	36.6

Source: UDISE + : 2021–2022

Bold numbers are significantly low with 20% or below

5.1 Availability of computer facilities in the schools (High)

Table 1 shows the percentage of computer facilities available in schools across the states. As per the UDISE +-2021–2022 reports, 95.8% of private unaided schools in the state of Andhra Pradesh have computer facilities whereas neither Govt. nor Govt. Aided schools have sufficient computer facilities. Further in the state of Chhattisgarh-89.4% of all management, and 91.8% of Govt. have adequate computer facilities but in Govt. and Pvt. The unaided school does not have adequate computer facilities. In the state of Goa 94.3% Govt. Aided and 95.7% Pvt. Unaided schools have ample computer facilities while on the other hand Govt. schools do not have substantial computer facilities. Gujarat has ample computer facilities in All Management of schools with 98.4% Govt., 99.2% Govt. Aided, 96.6% Pvt. Unaided schools. Similarly, the state of Haryana has sufficient computer facilities in schools as 93.2% All Manag., 92.6% Govt., 87.5% Govt. Aided and 95.2% Pvt.

Table 3 Percentage of school with functional computer facility, 2021–22 (UDISE +) (Above 80%)

Sl. No	State	All management	Government	Govt. Aided	Pvt. Unaided
1	Chhattisgarh	**82.8**	**84.4**	48.7	75.2
2	Goa	54.4	20.3	**94.1**	**95.7**
3	Gujarat	**97.8**	**98.2**	**99.2**	**96.2**
4	Haryana	**91.6**	**90.3**	**87.5**	**94.9**
5	Jharkhand	**82**	**85.3**	36.3	**89.6**
6	Karnataka	54.1	37.8	76.4	**87.3**
7	Kerala	**98.2**	**96.1**	**99.9**	**98.4**
8	Maharashtra	78.6	68	**92.5**	**96.8**
9	Mizoram	52	41.4	79.6	70.7
10	Nagaland	54	41.5	0	**86.3**
11	Punjab	**99.5**	**99.9**	**92**	**99.1**
12	Sikkim	**88.6**	**86.5**	73.7	**94.4**
13	Tamil Nadu	77	79.3	46.7	**90.2**
14	Uttarakhand	55	45.3	75.8	**84**

Source: UDISE + 2021–2022

Bold numbers are significantly high with 80% and above

Table 4 Percentage of school with functional computer facilities, 2021–22 (UDISE +) (Below 20%)

Sl. No	State	All management	Government	Govt. Aided	Pvt. Unaided
1	Andhra Pradesh	47.9	32.7	31.9	95
2	Arunachal Pradesh	32.2	20.8	94.1	87.9
3	Assam	**16.3**	**13.9**	**7.8**	54
4	Bihar	**18.3**	**8.6**	20.2	70.6
5	Himachal Pradesh	39.5	30.3	0	93.1
6	Madhya Pradesh	25.2	**11.8**	39.1	65.7
7	Manipur	35.9	20.2	**8.1**	92.7
8	Meghalaya	**17.8**	**10.9**	22.7	30.6
9	Odisha	25.5	**17.7**	31.3	75.1
10	Rajasthan	49.8	35.3	**0**	79.9
11	Telangana	42.2	26.8	37.1	80.7
12	Tripura	31.2	27.4	72.1	79.9
13	Uttar Pradesh	25.8	**7.2**	54.5	49.8
14	West Bengal	**18.1**	**15.8**	61.4	35.9

Source: UDISE + 2021–2022

Bold numbers are significantly low with 20% or low

Unaided. Furthermore, in the state of Jharkhand 85.2% All Manag., 89% Govt., 90.6% Pvt. Unaided schools have enough computer facilities but the Govt. Aided schools have no significant computer facilities. In the state of Karnataka 88.5% of Pvt. Unaided schools have computer facilities whereas neither Govt. nor Govt. Aided schools have sufficient computer facilities. In the state of Kerala, all kinds of school management are 96.2% Govt., 99.9% Govt. Aided, 98.6% Pvt. Unaided has ample computer facilities.

Additionally, in the state of Maharashtra- 81.4% of All Management schools, 93.4% Govt. Aided schools, 97.3% of Private Unaided schools have computer facilities but Govt. schools do not have sufficient computer facilities. 81.7% Govt. Aided schools in the state of Mizoram have computer facilities whereas neither Govt. nor Pvt. Unaided has enough computer facilities. Moreover, in the state of Nagaland 87.7% of Pvt. Unaided schools have computer facilities but the remaining do have not sufficient computer facilities. In the state of Punjab, all types of management schools have ample computer facilities as 99.6% all management schools, 100% Govt. schools, 92.4% Govt. Aided schools and 99.1% Pvt.

Table 5 Percentage of schools having PCs with functional integrated teaching learning devices, 2021–22 (UDISE +) (Above average)

Sl. No	State	All Management	Government	Govt. Aided	Pvt. Unaided
1	Goa	10.3	2.2	**19.6**	20.1
2	Gujarat	**22.7**	**14.6**	**34.2**	**38.5**
3	Haryana	11.5	4.7	12.5	23.5
4	Maharashtra	14	5.8	**23.2**	30
5	Kerala	13	8.3	7.6	**32.1**
6	Punjab	**21.1**	**19.1**	8.4	**26.7**
7	Sikkim	**18.7**	**18.3**	10.5	20
8	Tamil Nadu	**16.4**	**11.8**	9.5	**34.7**
9	Telangana	11.7	**13.9**	3.6	7.1

Source: UDISE + 2021–2022

Bold numbers are high with above average among different management types' schools

Table 6 Percentage of schools having PCs with functional integrated teaching learning devices, 2021–22 (UDISE +) (Below Average)

Sl. No	State	All Management	Government	Govt. Aided	Pvt. Unaided
1	Andhra Pradesh	8.8	2.6	4	27.9
2	Arunachal Pradesh	6.5	4	10.3	20.3
3	Assam	**1.7**	**1.2**	**0.3**	**7.5**
4	Bihar	**1.9**	**0.2**	**1.5**	**13**
5	Chhattisgarh	**2.7**	**1.5**	**2.9**	**10.7**
6	Himachal Pradesh	7.4	5.1	**0**	21.1
7	Jharkhand	**2.9**	**1.5**	**2.3**	21.9
8	Karnataka	8.4	3	8.2	22
9	Madhya Pradesh	**2.9**	**0.5**	**3.8**	**10**
10	Manipur	4.5	**1**	**0.3**	16.9
11	Meghalaya	**1.9**	**0.8**	**3**	**3.4**
12	Mizoram	**2.2**	**1.8**	6.1	**2.2**
13	Nagaland	6	**2.5**	**0**	15.3
14	Odisha	**3.4**	**1.6**	**2.6**	15.9
15	Rajasthan	6	3.1	**0**	**11.9**
16	Tripura	**2.8**	**1.7**	7	16.3
17	Uttar Pradesh	**2.2**	**1.7**	7	16.3
18	Uttarakhand	5	**2**	**3.5**	15
19	West Bengal	**4.1**	3.5	12.5	**8.8**

Source: UDISE + 2021–2022

Bold numbers are low with below average among different management types' school

Unaided schools have computer facilities. 83.2% Pvt. Unaided schools in the state of Rajasthan have computer facilities rest do not have sufficient computer facilities. 89.9% all management, 88.1% Govt, and 94.9% Pvt. Unaided schools in the state of Sikkim have enough computer facilities but in Govt. Aided schools have not. Further in the state of Tamil Nadu 81% Govt. and 91.1% of Pvt. Unaided schools have sufficient computer facilities but in Govt. Aided schools do have not enough computer facilities. In the state of Uttarakhand 85.3% of Pvt. Unaided schools have computer facilities whereas neither Govt. nor Govt. Aided schools have sufficient computer facilities.

Chhattisgarh, Gujrat, Haryana, Jharkhand, Kerala, Maharashtra, Punjab, and Sikkim have a high availability of computer facilities in all management types of schools. Some of these states have achieved good positions by securing high grades; Chhattisgarh (Prachesta -3), Gujrat (Prachesta -2), Haryana (Prachesta -2), Jharkhand (Prachesta -3), Kerala (Prachesta -2), Maharashtra (Prachesta -3), Sikkim (Prachesta -2) and Punjab (Prachesta -1) also achieved a much better position

in terms of 'Infrastructure and Facility (IF) (PGI 2.0, 2021–2022).[1] The grading scale for the performance parameters of Infrastructure and Facilities are given as follows; (Daksh 172.9–190.0, Utkarsh 153.9–172.8, Atti-Uttam 134.9–153.8, Uttam 115.9–134.8, Prachesta -1 96.9–115.8, Prachesta -2 77.9–96.8, Prachesta -3 58.9–77.8, Akanshi-1 39.9–58.8, Akanshi-2 20.9–39.8, Akanshi-3 0–20.8).

All states that have performed well in terms of computer availability are placed in Table 1, namely Chhattisgarh, Gujrat, Haryana, Jharkhand, Kerala, Maharashtra, Punjab, and Sikkim, here all states except Sikkim come under the category of developed states. Due to stability in the political and economic system, there is adequate availability of resources and continuous progress in the development field. Therefore, these states invest adequately on education, besides the budget of the central government. As a result, computers and functional computer facilities are available in sufficient quantity in schools mentioned in these eight states across the country. These states were given a place for good performance in the category of 'infrastructure and facility' in the Performance Grading Index [13].

5.1.1 Availability of computer facilities in the schools (Low)

Table 2 shows the low percentage of computer facilities available in schools across the states. UDISE + 2021–22 reports expose that, in the state of Assam just 18.9% of all management, 17.1% Govt., and 8.4% Govt. Aided schools have computer facilities. Moreover, in the state of Bihar only 18.9% of all management and 9% Govt. schools have computer facilities. In the state of Himachal Pradesh, there is no Govt. Aided schools. Further in the state of Madhya Pradesh only 12.4% Govt. schools have computer facilities. Additionally, just 8.6% Govt. Aided schools in the state of Manipur have computer facilities. In the state of Meghalaya nearly 11.2% Govt. schools have computer facilities. Further only 18.3% Govt. schools have computer facilities in the state of Odisha. In addition, just 8.1% of government schools have computer facilities in Uttar Pradesh state. In the state of West Bengal nearly 16% Govt. schools have computer facilities.

Table 2 shows the data of four states Assam, Bihar, Meghalaya, and West Bengal which have low performance in terms of computer facilities. Out of which three states Assam, Bihar, and Meghalaya are still in the category of developing states. Hence these states are still moving towards economic development but their economic development has not been achieved. Due to this, they are dependent on the financial assistance of the central government in economic matters, and apart from the financial assistance received by the central government in the field of education, these states are unable to spend more on its own in the field of education. The fourth state West Bengal comes in the category of developed states, but the report of low performance in computer facilities in all management schools of the state has surprised everyone. The state which is completely equipped with all kinds of resources, also lacks technical facilities in its schools. The possible reason for this could be the poor administrative system and lack of awareness of education through technology.

5.2 Functional computer facility in schools (High)

Table 3 shows the percentage of functional computer facilities available in schools across the states. According to UDISE + -2021–2022 reports, 84.4% Govt. schools in the state of Chhattisgarh have functional computer facilities whereas neither Govt. Aided nor Pvt. Unaided schools have sufficient computer facilities. In the state of Goa 94.1% Govt. Aided and 95.7% Pvt. Unaided schools have ample functional computer facilities but in Govt. schools they do not have adequate functional computer facilities. Further, in the state of Gujarat, all types of management schools have ample functional computer facilities as 98.2%, and 99.2% Govt. Aided and 96.2% Pvt. Unaided schools have functional computer facilities. Similarly, in the state of Haryana, all kinds of management schools have sufficient functional computer facilities as 90.3% Govt., 87.5% Govt. Aided and 94.9% Pvt. Unaided schools have functional computer facilities. In the state of Jharkhand 85.3%Govt., and 89.6%Pvt. Unaided schools have enough functional computer facilities but as similar in Govt. Aided schools do not have sufficient functional computer facilities. Moreover in the state of Karnataka 87.3% Pvt. Unaided schools have sufficient functional computer facilities while remaining do not have functional computer facilities.

In addition, in the state of Kerala, all management schools have ample functional computer facilities as 96.1% Govt., 99.9% Govt. Aided and 98.4% Pvt. Unaided schools have functional computer facilities. In the state of Maharashtra 92.5%Govt. Aided and 96.8% Pvt. Unaided schools have sufficient functional computer facilities but in Govt. schools

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do not have functional computer facilities. There are no functional computer facilities available in any kind of school in Mizoram state. Whereas 86.3% Pvt. Unaided schools in the state of Nagaland have sufficient functional computer facilities but the rest have no functional computer facilities. Additionally, all types of schools in Punjab state have adequate functional computer facilities as 99.9% Govt., 92%Govt. Aided and 99.1% Pvt. Unaided. In the state of Sikkim 86.5% Govt. and 94.4% Pvt. Unaided schools have enough functional computer facilities but Govt. Aided schools do not have sufficient functional computer facilities. Furthermore, in the state of Tamil Nadu 90.2% of Pvt. Unaided schools have adequate functional computer facilities while the rest do not have sufficient functional computer facilities. Similarly, in the state of Uttarakhand 84% of Pvt. Unaided schools have enough functional computer facilities but the remaining do not have sufficient functional computer facilities.

Chhattisgarh, Gujrat, Haryana, Jharkhand, Kerala, Punjab, and Sikkim have all demonstrated strong performance in computer-functional availability in all management-type schools; similarly, these states achieved a satisfactory position by securing grade Gujrat (Akanshi-1), Haryana (Prachesta-3), Jharkhand (Akanshi-1), Kerala (Akanshi-1), Punjab (Prachesta-2), and Sikkim (Akanshi-1) in terms of 'Learning Outcomes'[13]. The grading scale for the performance parameters of 'Learning Outcomes are given as follows (Daksh 218.4–240.0, Utkarsh 194.4–218.3, Atti-Uttam 170.4–194.3, Uttam 146.4–170.3, Prachesta -1 122.4–146.3, Prachesta -2 98.4–122.3, Prachesta -3 74.4–98.3, Akanshi-1 50.4–74.3, Akanshi-2 26.4–50.3, Akanshi-3 0–26.3).

It is clear from the above results (Table 3) that in the states where computer facilities were found in sufficient quantity in all management-type schools, except Maharashtra, computer functional facilities are also available in sufficient quantity. In Maharashtra, the difference between the availability of computers and functional computers is negligible. On this basis, it can be said that due to strong administrative, and economic systems, and awareness of the importance of technology in education, computers are not only available in abundance in these states, but they are also available in better functional condition which is an example of better development in any education system.

5.2.1 School with functional computer facilities (Low)

Table 4 shows the low percentage of functional computer facilities available in schools across the states. As per the UDISE + -2021–2022 reports, in the state of Assam only 13.9% Govt. and 7.8% Govt. Aided schools have functional computer facilities. Further, in the state of Bihar just 8.6% Govt. schools have functional computer facilities. In the state of Himachal Pradesh, there is no Govt. Aided schools. Moreover, in the state of Madhya Pradesh, nearly 11.8% of schools have functional computer facilities. In the state of Manipur just 8.1% Govt. Aided schools have functional computer facilities. Only 10.9% Govt. schools in the state of Meghalaya have functional computer facilities. Furthermore, in the state of Odisha nearly 17.7% Govt. schools have functional computer facilities. In the state of Rajasthan, there is no Govt. Aided schools. In addition, just 7.2%Govt. schools in the state of Uttar Pradesh have functional computer facilities. In the state of West Bengal only 15.8% Govt. schools have functional computer facilities.

It is evident from the results of Table 4 that in the states where computer facilities were at a very low level in all management types of schools, computer functional facilities were also found to be at a low level. It is clear that in schools where computer facilities are not available, the availability of computers in functional conditioners will only be questionable.

5.3 Schools having PCs with functional integrated teaching learning devices (above average)

Table 5 displays the Percentage of Schools Having PCs With Functional Integrated Teaching Learning Devices as per the UDISE + 2021–22 report. The availability of PCs with Functional Integrated Teaching Learning Devices in schools above the mean value (of all management along with Govt., Govt. aided, and Private) is placed in the above-average category considered as sufficient availability of Functional Integrated Teaching Learning Devices. In the same order, the mean value of the availability of PCs with Functional Integrated Teaching Learning Devices in All Management type schools is 15.48%, Govt. schools is 10.96%, Govt. Aided is 14.38% and Private Unaided school is 25.85%.

The report exposes that All Management schools in the states of Gujarat 22.7%, Punjab 21.1%, Sikkim 18.7%, and Tamil Nadu 16.4% have PCs with Functional Integrated Teaching Learning Devices. Furthermore, according to the UDISE + (2021–2022) report, Government schools in the states of Gujarat 14.6%, Punjab 19.1%, Sikkim 18.3%, Tamil Nadu 11.8%, and Telangana 13.9% have PCs with Functional Integrated Teaching Learning Devices. In addition, Government Aided schools in the states of Goa 19.6%, Gujarat 34.2% and Maharashtra 23.2% have PCs with Functional Integrated Teaching Learning Devices. Private Unaided management schools in the states of Gujarat 38.5%, Kerala 32.1%, Punjab

26.7% and Tamil Nadu 34.7% have PCs with Functional Integrated Teaching Learning Devices. While the states of Gujrat, Punjab, Sikkim, and Tamil Nadu have performed well in terms of the availability of PCs with Functional Integrated Teaching Learning Devices across all management schools, the aspiration grades of Akanshi-1, Prachesta-2, Akanshi-1, and Prachesta-2 respectively in terms of learning outcomes and quality (PGI 2.0, 2021–22). The states of Gujrat, Punjab, Sikkim, and Tamil Nadu maintained good performance in terms of the accessibility of PCs equipped with Functional Integrated Teaching Learning Devices in all management schools. These states have also achieved the desired learning outcomes and quality assessments of Akanshi-1, Prachesta-2, and Akanshi-1, respectively (PGI 2.0, 2021–22).

It is evident from the results of Table 5 that the availability of PCs With Functional Integrated Teaching Learning Devices in all management-type schools of Gujarat, Punjab, and Sikkim states is above average, along with this the availability of computers and functional computers were at a high level in these states. On the other hand, the availability of computers and functional computers in all management-type schools of Tamil Nadu state was about 78% and the availability of PCs With Functional Integrated Teaching Learning devices was found to be above average. It is clear from this that the states that understand the importance of computers, the availability of functional computers in schools, and their need in education are at a high level in the availability of PCs With Functional Integrated Teaching Learning Devices.

5.3.1 Schools having PCs with functional integrated teaching learning devices (Below Average)

Table 6 explores the low percentage of schools having PCs with Functional Integrated Teaching Learning Devices as per the UDISE + 2021–22 report. The availability of PCs with Functional Integrated Teaching Learning Devices in schools below the mean value is placed in the below-average category and considered as a lack of facilities in schools. In the same order, the mean value of the availability of PCs with Functional Integrated Teaching Learning Devices in All Management type schools is 4.27%, Govt. schools is 2.06%, Govt. Aided is 3.96% and Private Unaided school is 14.54%.

According to the UDISE + report in the states of Assam 1.7%, Bihar 1.9%, Chhattisgarh 2.7%, Jharkhand 2.9%, Madhya Pradesh 2.9%, Meghalaya 1.9%, Mizoram 2.2%, Odisha 3.4%, Tripura 2.8% and Uttar Pradesh 2.2%, West Bengal 4.1% only are with all management schools having PCs with Functional Integrated Teaching Learning Devices. Similarly, just a few percentages in the government schools across the state of Assam 1.2%, Bihar 0.2%, Chhattisgarh 1.5%, Jharkhand 1.5%, Madhya Pradesh 0.5%, Manipur 1%, Meghalaya 0.8%, Mizoram 1.8%, Nagaland 2.5%, Odisha 1.6%, Tripura 1.7%, Uttar Pradesh 1.7% and Uttarakhand 2% government schools are having PCs with Functional Integrated Teaching Learning Devices.

Additionally, a very low percentage of Government Aided schools in the states of Assam 0.3%, Bihar 1.5%, Chhattisgarh 2.9%, Jharkhand 2.3%, Madhya Pradesh 3.8%, Manipur 0.3%, Meghalaya 3%, Odisha 2.6%, and Uttarakhand 3.5% Schools having PCs with Functional Integrated Teaching Learning Devices. Further, only some Private Unaided schools in the states of Assam 7.5%, Bihar 13%, Chhattisgarh 10.7%, Madhya Pradesh 10%, Meghalaya 3.4%, Mizoram 2.2%, Rajasthan 11.9%, and West Bengal 8.8% Schools Having PCs with Functional Integrated Teaching Learning Devices.

It is evident from the results of Table 6 that the availability of PCs with Functional Integrated Teaching Learning Devices is not upto the mark in government schools. In all management-type schools in most states of India is less than the average. Most of these are the states which have low availability of computers and functional computers. These states are Arunachal Pradesh, Uttarakhand, Tamil Nadu, Rajasthan, Mizoram, Assam, Nagaland, Andhra Pradesh, Goa, Karnataka, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Odisha, Telangana, Tripura, Uttar Pradesh, West Bengal, and Tamil Nadu include. It is no surprise that the availability of PCs with Functional Integrated Teaching Learning Devices is also low in the schools of states where there is a lack of computer and functional computer facilities. To deal with this shortage, there is an urgent need for intervention in the educational system, financial support, and efficient administration in the states.

6 Conclusion and discussion of the study

The researcher analyzed different segments of technology and related facilities in schools with different types of management across the states of India. The analysis has been carried out based on the UDISE + [17] report with a detailed description of computers, functional computers, and PCs with functional integrated teaching learning devices available across all types of schools in India. Here, regional disparity can be seen based on the availability of computers, functional availability, and also the status of technical resources in schools. Apart from this, differences were also found in the schools based on school management and the availability of technical resources.

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The availability of technological resources in the present situation shows the gap between policy and practice in education. While educational policies and programs discuss the use of technology to deliver instruction, a lack of technical supplies was also seen in schools, particularly in government schools, where the children who are most economically, socially, and geographically disadvantaged in India obtain their education. Lack of funding is one of the main causes of this, and it may also be accompanied by improper access to facilities. With enough government funding as well as the assistance of non-governmental organizations and other social groups, this shortfall in state-level, government, and government-aided schools can be filled. In addition to establishing inclusive classrooms in government schools through the provision of technical facilities, there is a need to work towards improving the learning outcomes of students. Stakeholders must work together to address gaps in technology access, assist in teachers' professional development, and push for policies that advance digital equity, We also need to keep looking for new and creative ways to use technology to improve education, personalize instruction, and enable students to realize their full potential [7].

Besides, the provisions, facilities and funding patterns are similar by the central government under Samagra Shiksha Scheme for different states in India but the contribution of the respective states varies which further results in regional disparity. It was also observed that the majority of the states in India either delay or deduct their financial contribution to the schemes run by the central government due to several reasons. There were also instances in several states, where lack of supplementary infrastructure and trained staff in the schools resulted in regional disparity in terms of functional availability of technology and PCs with Functional Integrated Teaching Learning Devices. There is also a probability to discuss here the relationship between such regional disparities in different states and low learning outcome levels in these states as reported by the ASER 2023 and previous reports along with NCERT [10, 11].

Regional disparity in educational provisioning and accessibility, potentially, will support the developmental disparities in different regions of the country as reiterated in the Human Development Index in previous years. Therefore, uniformity in technology-based educational provisioning harmoniously by both central and state governments in terms of financial support, making technology available and accessible by the students uniformly and functional availability of the technology support system deemed to be the need of the hour. To sustain the initiatives and accomplish its overall goal, present circumstances should include an institutional and methodical whole-school approach to ICT use that addresses the domain of ICT vision and planning, school culture, ICT infrastructure, and resources [2]. Such educational accessibility can be possible with the greater contribution of the central government to the education sector in general and the school education sector in particular. The nation's educational system can be improved and more competent employees will be produced in the future by utilizing technology in the classroom [15].

Declarations

Competing interests The authors declare no competing interests.

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