PERFORMANCE OF "DIGITAL INDIA PROGRAMME" IN THE RURAL EDUCATION SECTOR IN INDIA – A POST-COVID ANALYSIS

by

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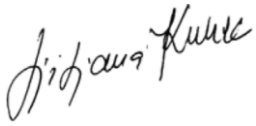

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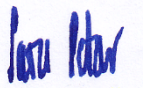

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Dedication

I am dedicating this thesis to my beloved people who have meant and continue to mean so much to me. First and foremost, to my paternal grandmother Nirmal Bhageria whose love for me knew no bounds and, who taught me the value of hard work. Thank you so much “maa,” I will never forget you.

Next, my parents, Meenu and Vidhu Bhageria whose words of encouragement and push for tenacity ring in my ears. My sister Tanvi Bhageria who has never left my side and is incredibly special.

Last but not least I am dedicating this to my friends who have supported me throughout the process. I will always appreciate all they have done to encourage me and complete this thesis.

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ABSTRACT
PERFORMANCE OF "DIGITAL INDIA PROGRAMME" IN THE RURAL EDUCATION SECTOR IN INDIA – A POST-COVID ANALYSIS

Tushar Bhageria
2023

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The purpose of this research is to analyze the performance of the Digital India program in Rural India. The research also aims to understand how impactful the program was during COVID'19. The study aims to analyze the results by using both Qualitative and quantitative methods of research. This mixed-methods approach allows for a comprehensive understanding of the research problem by capturing both numerical data and qualitative insights. Qualitative methods of research include observations and Interviews while quantitative method includes surveys. Based on the findings from all the sources of information, results were triangulated, and analysis is formed.

The long-term goal of the research was to help policymakers and the government to take appropriate steps and actions to make the Digital India program a success. Also, since the program aims at various sectors of development including infrastructure, lifestyle, health, and education etc., with this paper it provided the deep analysis of how impactful the program has been in the various parts of the country for the education sector, specifically, rural India.

As a result of the analysis, it was noted that the Digital India Programme has made some efforts to improve digital infrastructure in rural areas. However, challenges such as

limited connectivity, infrastructure gaps, inadequate electricity supply, and inadequate access to devices persist, hindering the seamless implementation of digital education initiatives in rural India. The program has planned to expand access to digital education resources, online learning platforms, and e-content in rural India. While these plans will provide new learning opportunities to rural students, there are disparities in access due to the digital divide, particularly concerning internet connectivity and the availability of devices.

From the research, it was well understood that no online medium was used to promote Digital education in rural India. It is evident that no or limited learning happened during COVID'19. Though some of the alternative teaching methods were adopted by teachers and schools including rotational study plans and home assignments etc. there was no mention of the usage of digital tools to provide education. This was due to a lack of Digital infrastructure in villages and unawareness of the program among teachers and students. While there were measures taken to promote offline education, there is a need to understand the importance of the digital medium and resolve the challenges at the earliest to mitigate the shortcoming of offline education.

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CHAPTER I:

INTRODUCTION

1.1 Introduction

India is a big country with a population of 1.4Bn people residing in over 28 states and 8 Union territories. As per the census of 2011, 69% of the Indian population lives in 640K villages and are classified as rural citizens. In rural areas the literacy rate is 68.91% (male: 78.57%, female: 58.75%). As the rural economy currently contributes to 25-30% of the country's GDP, literacy in these parts is important for the Indian economy.

For the majority of the population living in rural areas, education is dependent on government-run or aided schools and non-governmental organizations (NGOs). But rural areas in India are still facing various barriers that directly impact the country's literacy rate. Some of these include poor infrastructure in government schools, non-availability of quality staff, the physical distance of students to school, Poor internet connection, Poverty, etc. To curb some of these issues, the government launched the 'Digital India' initiative in July 2015, to strengthen online infrastructure and expand internet accessibility among citizens (for example, connecting rural areas to high-speed internet networks). As part of the 'Digital India' initiative, the government also started an e-Education initiative to provide online education in remote and urban areas using smartphones, apps and internet services.

Further, amid the pandemic, the Indian government has taken several initiatives (e.g., PM eVIDYA program, DIKSHA, etc.) to make it at par with some global online education best practices and relaxed regulations for universities and colleges to offer extended online and distance learning opportunities to students.

With this research paper more answers on how effective the programs are run by the government in rural India for the education sector and how the strengthening of these can solve various problems of literacy rate, brain drain, unemployment, etc. will arise.

1.2 Research Problem

Digital India programme has been launched by the government of India in 2015 under the leadership of Prime Minister of India "Shri Narender Modi". Since its inception there are various enhancements done to the programme to make it more effective and reachable to a wider audience. The main objective of the Digital India Mission is "Power to Empower". The three core components of Digital India Initiatives are digital delivery of services, digital infrastructure creation, and digital literacy.

However, COVID 19 outbreak has bought some challenges in the delivery of the programme. While it has been a boon for the society, it has also turned out as a blessing for bringing digital shift in the country. More and more people have started using online mediums in their day to day living like for shopping, making bill payments, doing virtual meetings, making online reservations etc. However, usage of Internet is India are still limited to 47%. (Nielsen, 2022) The study titled Bharat 2.0 Internet Study, revealed that almost 60% of the rural population is still not actively using the internet, leaving headroom for further growth. Urban India on the other hand has registered a 59% penetration with 294 million active internet users.

With this research, the impact of Digital India programme in the education sector for the rural population will be easier to understand. Along with it will be important to know how effective the programme has been during COVID'19 outbreak and how rural education sector has coped up with this.

More specifically, the following research questions need to be addressed:

1. What are the challenges faced in Rural India by students during COVID'19 despite implementation of Digital India programme in India?
2. Is the programme impactful in rural parts of India for the education sector?
3. How difficult/easy it has been to adopt the e-education shift during COVID'19 and was it implemented successfully?
4. What all could be the possible solutions and innovation ideas that can help in making the programme success?

5. What all businesses can be developed and how can this affect Indian economy?

1.3 Purpose of Research

The long-term goal of the research is to help policy makers and the government to take appropriate steps and actions to make the digital India programme a success. Also, since the programme aims at various sectors of development including infrastructure, lifestyle, health, education etc, with this paper it would provide the deep down analysis of how impactful the programme has been in the different parts of the country for the education sector, specifically, rural India. Particularly, the study has the following sub-objectives:

1. To provide a comprehensive review of challenges currently faced in implementation of Digital India Programme.
2. To provide better insights on the impact of Digital India Programme for the education sector in rural India.
3. To see how the rural education sector of India dealt during the pandemic and is rural India ready for next pandemic.
4. To highlight what all could be the possible measures, solutions and innovation ideas government can adopt in the education sector using digital India programme.

The purpose of research in the effectiveness of digital education in rural India during COVID-19 is to gain insights into the challenges and opportunities presented by the pandemic and the shift to digital education in rural areas. Specifically, such research can help to:

1. Understand the impact of digital education on learning outcomes: Research can help to evaluate the effectiveness of digital education in maintaining or improving learning outcomes in rural areas during the pandemic. This can inform future policies and interventions to support digital education in rural areas.

2. Identify barriers and challenges to digital education in rural areas: Research can help to identify the specific challenges and barriers that prevent effective implementation of digital education in rural areas during times of crisis, such as the COVID-19 pandemic. This can

inform the development of strategies to address these challenges and promote equitable access to digital education.

3. Determine the most effective approaches for delivering digital education in rural areas: Research can help to identify the most effective approaches for delivering digital education in rural areas, including teacher training, curriculum development, and the use of appropriate technology. This can inform the development of effective interventions to support digital education in rural areas.

4. Assess the impact of the digital divide on education outcomes: Research can help to evaluate the impact of the digital divide on education outcomes in rural areas during the pandemic. This can inform policies and interventions to reduce the digital divide and promote equitable access to digital education.

5. Identify best practices for remote learning: Research can help to identify the best practices for remote learning in rural areas during the pandemic. This can include strategies for engaging students, supporting teachers, and ensuring effective use of technology.

6. Evaluate the effectiveness of existing digital education initiatives: Research can evaluate the effectiveness of existing digital education initiatives in rural areas and identify areas for improvement. This can inform the development of more effective digital education programs in rural areas.

7. Understand the impact of digital education on equity: Research can help to understand the impact of digital education on equity in rural areas during the pandemic. This includes assessing whether digital education exacerbates existing inequalities or whether it can be used to promote greater equity in education.

8. Identify the most effective ways to involve parents and the community: Research can identify the most effective ways to involve parents and the community in digital education initiatives in rural areas during the pandemic. This can help to ensure that these initiatives are sustainable and effective in the long term.

Overall, research on the effectiveness of digital education in rural India during COVID-19 can help to inform policy and practice in education, particularly in the context of remote and distance learning. It can provide insights into the challenges and opportunities presented by digital education in rural areas and guide the development of effective strategies to promote equitable access to education.

1.4 Significance of the Study

The study on the effectiveness of digital education in rural India during COVID-19 is significant for several reasons:

1. **Addressing educational inequalities:** The COVID-19 pandemic has exacerbated existing inequalities in education, particularly in rural areas where access to digital infrastructure and resources is limited. Understanding the effectiveness of digital education in rural areas can inform policies and interventions to address these inequalities and promote equitable access to education.

2. **Promoting innovation in education:** The pandemic has forced educators to adapt quickly to new modes of teaching and learning. Studying the effectiveness of digital education in rural areas can highlight innovative approaches to education that can be sustained beyond the pandemic.

3. **Informing policy and practice:** The findings of the study can inform the development of policies and interventions that support digital education in rural areas during and after the pandemic. These can include strategies for teacher training, curriculum development, and the use of appropriate technology.

4. **Improving the quality of education:** Understanding the effectiveness of digital education can help to improve the quality of education in rural areas by identifying areas of strength and weakness and guiding the development of effective interventions.

5. **Enabling student success:** Ultimately, the study on the effectiveness of digital education in rural India during COVID-19 can help to ensure that students in rural areas have access to high-quality education that enables them to succeed academically and beyond.

6. **Enhancing digital literacy:** Digital education requires a level of digital literacy, which can be especially challenging for individuals and communities with limited access to digital resources. The study can provide insights into how to enhance digital literacy in rural areas, which can have long-term benefits beyond education.

7. **Identifying opportunities for public-private partnerships:** The study can highlight opportunities for public-private partnerships to support digital education in rural areas, such as through the provision of digital infrastructure or the development of customized technology solutions.

8. **Facilitating peer-to-peer learning:** The study can facilitate peer-to-peer learning and knowledge-sharing among educators, students, and communities in rural areas, who may face similar challenges and can benefit from sharing their experiences and best practices.

9. **Providing a framework for future research:** The study can provide a framework for future research on digital education in rural areas, such as examining the long-term impacts of digital education on student outcomes or evaluating the cost-effectiveness of digital education initiatives.

The study on the effectiveness of digital education in rural India during COVID-19 is significant because it has the potential to inform a wide range of stakeholders, including policymakers, educators, students, and communities, about the opportunities and challenges presented by digital education in rural areas. It can help to identify effective strategies to promote equitable access to education and support student success, as well as inform future research in this area.

1.5 Research Questions

The reseach questions includes –

1. What are the challenges faced by the rural education sector in implementing the Digital India Programme?
2. To what extent has the Digital India Programme been successful in Rural India?
3. What are the perceptions of rural students, teachers, and parents towards the Digital India Programme?
4. How has the pandemic affected the education sector for rural students and teachers?
5. What measures can be taken to improve the implementation and effectiveness of the Digital India Programme in rural education?
6. What all businesses can be developed as the benefit of this programme?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework

2.1.1 Education Sector in India

Education in today's world is as important as food, water, and shelter. As per UNESCO (UNESCO, 2022), Education is the process of facilitating learning or the acquisition of knowledge, skills, values, beliefs, and habits. Quality education specifically entails issues such as appropriate skills development, gender parity, provision of relevant school infrastructure, equipment, educational materials and resources, scholarships, or teaching force. The Indian education sector also aims to provide the students with universal access to quality education which in turn will lead to the overall growth of the individual, their family, the society, and the economy.

Education in India is primarily managed by a state-run public education system, which falls under the command of the government at three levels: Central, state and local. Under various articles of the Indian Constitution and the Right of Children to Free and Compulsory Education Act, 2009, free and compulsory education is provided as a fundamental right to children aged 6 to 14. The approximate ratio of public schools to private schools in India is 7:5.

The government of India has a dedicated department for education – the Department of School Education and Literacy. This department is responsible for ensuring quality education to everyone in the country. (Department of School Education and Literacy, 2021) Department of School Education and Literacy through its autonomous/Statutory bodies, i.e. CBSE, KVS, JNV, NIOS and NCTE and its centrally sponsored scheme of Samagra Shiksha, PM Poshan, Padhna Likhna Abhiyan and central sector scheme of National Means cum Merit Scholarships tries to ensure quality education system, with particular focus on historically marginalized,

disadvantaged, and underrepresented groups for achieving economic and social mobility, inclusion, and equality.

The government has also laid down various policies for promoting education in India including National Education Policy (Formed in 1986, Last revised in 2020). (Ministry of HRD, 2020) Along with various updated in the policy, one major development in policy was in 2009 which stated Free and Compulsory education Act 2009 which laid down legal underpinnings for achieving universal elementary education.

(India Book 2020 - A Reference Annual, 2020) As per the latest census conducted in 2011, the literacy rate in the country is 74.04 per cent, 82.14 for males and 65.46 for females. Kerala, south Indian state has highest 93.91 per cent literacy rate, closely followed by Lakshadweep (92.28 per cent) and Mizoram (91.58 per cent) whereas Bihar has a literacy rate of 63.82 per cent and ranks last in the country preceded by Arunachal Pradesh (66.95 per cent) and Rajasthan (67.06 per cent).

There are various stages of Education as stated by National Education policy that are being followed in the country currently. Refer Table 1 for reference.

Category		Grade	Ages	Comments
Compulsory education (India)				
Foundational Stage	Preschool (Urban) / Anganwadi (Rural)	Pre-kindergarten	3-4	This will cover children of ages 3–8 years. The focus of studies will be in activity-based learning.
		Kindergarten	4-6	
	Primary School	1st grade	6-7	
		2nd grade	7-8	

Category		Grade	Ages	Comments
Compulsory education (India)				
Preparatory Stage		3rd grade	8-9	It will gradually introduce subjects like speaking, reading, writing, physical education, languages, art, science, and mathematics.
		4th grade	9-10	
		5th grade	10-11	
Middle Stage	Middle School	6th grade	11-12	It will introduce students to the more abstract concepts in subjects of mathematics, sciences, social sciences, arts, and humanities.
		7th grade	12-13	
		8th grade	13-14	
Secondary Stage	Junior High school	9th grade	14-15	These 4 years of study are intended to inculcate multidisciplinary study, coupled with depth and critical thinking. Multiple options of subjects will be provided.
		10th grade	15-16	
	Senior High school	11th grade	16-17	
		12th grade	17-18	
Higher education (India)				

Category		Grade	Ages	Comments
Compulsory education (India)				
College(University)	Undergraduate school	First year	18-19	1-year Vocational Certificate
		Second year	19-20	2-years Vocational Diploma
		Third year	20-21	3-years bachelor's degree (Optional and limited)
		Fourth year	21-22	4-years multidisciplinary bachelor's degree (Preferred)
		Fifth year	22-23	5-years MBBS, a bachelor's degree in medicine.
	Graduate school	First year	21+	(With various degrees and curricular partitions thereof)
		Second year	22+	
		Third year	23+	
	Doctorate		24+	
Research				
	Postdoctoral			
Continuing education				

Category	Grade	Ages	Comments
Compulsory education (India)			
Vocational school		18 and up	
Adult education			

Table 1 Stages of Education in India

There are several types of school in India –

1. **Government Schools** – These are the schools that are run by state and central government within the country.
2. **Government Aided Private Schools** – These schools are funded partially by the government and run-on charitable trust.
3. **Private Schools** – These schools are run by private bodies, individuals, or any trust. The government does not provide any funding to these school however there are some legal obligations laid by the government that are to be followed by these schools.
4. **National Schools** – These schools are usually private in nature but are spread across the country to ensure best quality education. Some of the examples include DPS, DAV Public school etc.
5. **International Schools** – An international school is a school that promotes international education in an international environment. International schools usually adopt a curriculum such as that of the International Baccalaureate, Edexcel, Cambridge Assessment International Education, International Primary Curriculum, or Advanced Placement.

6. **Home Schooling** – This is a median in which parents are allowed to instruct their kids at home. This is legal in India, however there are still debates around this topic.
7. **NGO** – These are non-government organizations that are independently helping educate the underprivileged section of the society including SC, ST urban poor, child engaged in child labor or a child with disabilities. They get funding from some private parties or the upper section of the society, political parties etc.

2.2.2 Education Sector in Rural India

As per the census 2011, nearly 69% of population is still living in rural parts of India. Majority of the families in rural India are dependent on agriculture for their livelihood. Also, since the land and the crops need close attention and efforts day and night for a successful harvest, all the family members are engaged in farming activities. Other occupation in villages usually include blacksmiths, carpenters, or potters. Not only adults but also children of all age are engaged in one such activity to provide extra hand to the family. Since everyone in the family is responsible for earning, gaining education in rural India has become a challenge for children of all age. (ASER, 2021)According to Annual Status of Education Report (ASER), the survey was conducted and cover almost all rural districts; it was found that more than 50% of the children of age 3 to 16 years are not able to read and perform arithmetic abilities in the age group of 5to 16 years. However, the problems related to education in rural India are:

1. **Lack of availability of resources** – There is a lack of availability of resources in rural part of India including good infrastructure (Schools, Roads, washrooms, water etc.). Not only this but also there is less availability of teachers who can instruct students.
2. **Lack of awareness of educational importance** – In rural India, there is lack of awareness of the importance of education. People in rural regions are mostly engaged in

agricultural and allied sectors and have a believe that education is mere waste of time and instead of going to school they can start earning by going on farming fields. Children from the beginning are engaged in these sectors and not give much importance to their studies.

3. **Less availability of schools** – There is very less availability of schools in rural villages of India. Many students travel from one village to another village by covering miles of distance and due to challenges like non-availability of transport, it takes long hours to reach school and to come back home.
4. **Financial condition** – This is one of the key factors that is impacting education. People in rural India are mostly farmers. They are dependent on numerous factors like the weather conditions, harvest, market rates of crops etc. for getting the yields from there farm. Even if one crop season fails, they are in huge debt from money lenders, banks etc. Hence, they want everyone in their family to focus on farms and not waste their time by going to schools.
5. **Gender Divide** – In rural India, girls continue to be less educated than boys. Female education in rural India is still considered a taboo. Females are working at home, managing household chores, and managing the family.

To overcome these challenges and promote education in rural India, Government of India has launched various programs ((Banasree P, 2021) –

1. **Jahawar Navodaya Vidyalaya -** The Ministry of HRD is running Jawahar Navodaya Vidyalayasin various states across the country (except Tamil Nadu) and provides free and quality education to talented rural children, comparable to the best in a residential school system for class VI to XII.

2. **Samagra Shiksha** – It is launched as an Integrated Scheme for School Education extending from pre-school to class XII. The Samagra Shiksha Scheme supports the states for strengthening the school infrastructure in rural areas. It focuses on the improvement of quality of education by providing support for different interventions like in-service training of teachers and school heads, grants for the library, sports and physical activities, support for Rashtriya Avishkar Abhiyan, ICT (Information and Communication Technology) and digital initiatives, remedial teaching for academically weaker students etc.
3. **Revamped Kasturba Gandhi Balika Vidyalaya (KGBV) Scheme** – The revamped scheme of KGBV under Samagra Shiksha will provide the facility of at-least one residential school for girls from Classes VI-XII in every educationally backward block which does not have residential schools under any other scheme.
4. **Mid-Day Meal Scheme** – One of the objectives of this scheme was to attract children from disadvantaged sections. Around 9.12 crore children were benefitted from the hot cooked nutritious food in 11.35 lakh schools during 2018-19.
5. **Revamped Eklavya Model Residential School (EMRS) Scheme** – The objective of EMRS is to provide quality and free of cost middle and high-level education to the Scheduled Tribes (ST) students especially the ones in remote areas. By the year 2022, every block with more than 50 percent ST population and at least 20000 tribal persons, will have an Eklavya Model Residential School.
6. **Swachh Vidyalaya Initiative** – The Department of School Education and Literacy launched the Swachh Vidyalaya Initiative (SVI)for construction and repair of separate toilets for children in every school which was completed within a year in 2015.

There are various other programs as well launched by GoI including Digital India Education Initiative.

2.2.3 Digital India Programme

Digital India Programme is an initiative by government of India and current prime minister Shri Narender Modi. This programme has been developed with a motive of revamping India into a digitally empowered nation. The programme is managed by a Monitoring Committee on Digital India headed by the Prime Minister and a Digital India Advisory Group chaired by the Minister of Communications & IT and an Apex Committee chaired by the Cabinet Secretary.
(Ministry of Electronics and IT, 2022) E-governance initiatives in India took a broader dimension in the mid-1990s for wider sectoral applications with emphasis on citizen-centric services. The major ICT initiatives of the Government included, inter alia, some major projects, such as railway computerization, land record computerization etc., which focused mainly on the development of information systems.
(Sharma, 2016) The vision of Digital India initiative includes-

1. **Digital Infrastructure as a core utility to every citizen** - The Digital India initiative has a vision to provide high speed internet services to its citizens in all Gram Panchayats. Bank accounts will be given priority at individual level. People will be provided with safe and secure cyber space in the country
2. **Government and services on demand** - Government services will be available online where citizens will be ensured easy access to it. Transactions will be made easy through electronic mediums.
3. **Digital Empowerment of citizens** - This is one of the most crucial factors of the Digital India initiative to provide universal digital literacy and make digital sources easily

accessible. The services are also provided in Indian languages for active participation.

(Sharma, 2016)and (Ministry of Electronics and IT, 2022)Digital India comprises of various initiatives under the single programme each targeted to prepare India as a knowledge economy and for bringing good governance to citizens through synchronized and coordinated engagement of the entire Government. There are 9 pillars/projects under digital initiative including –

1. **Broadband Highways:** The first step is to provide high speed broadband highways through fiber optics that connect all the remote areas, government departments, universities, research, and development etc. Web based portals and Mobile apps will be developed to access online information while on the move.
2. **Universal access to mobile connectivity:** This initiative focuses on network penetration and filling the gaps in connectivity in the country. There are around 55,619 villages in the country that do not have mobile coverage. As part of the comprehensive development plan for Northeast, providing mobile coverage to uncovered villages has been initiated. Mobile coverage to remaining uncovered villages would be provided in a phased manner.
3. **IT Training for Jobs:** This pillar focuses on providing training to the youth in the skills required for availing employment opportunities in the IT/ITES sector.
4. **Electronics Manufacturing:** This pillar focuses on promoting electronics manufacturing in the country with the target of NET ZERO Imports as a striking demonstration of intent. This ambitious goal requires coordinated action on many fronts, such as taxation, incentives, economies of scale, eliminating cost disadvantages etc.
5. **Public Internet Access Programme:** Virtuous technologies that support cost containment, collaboration, security, services-on-the-go, social-connect, and in-built

intelligence that deliver remote access to any information or service available across the domain. This change will open new doors of e-services to every citizen.

6. **E- Governance:** Government Process Re-engineering using IT to simplify and make the government processes more efficient is critical for transformation to make the delivery of government services more effective across various government domains and therefore needs to be implemented by all Ministries/ Departments.
7. **E-Kranti:** This Kranti will fully focus on digital knowledge program where education, health, farming, rights, financial and many more services will be delivered on a very high bandwidth.
8. **Information for All:** Global Information: Hosting data online and engaging social media platforms for governance is the aim of the government. Information is also easily available for the citizens. MyGov.in is a website launched by the government for a 2-way communication between citizens and the government. People can send in their suggestions and comment on various issues raised by the government, like net neutrality.
9. **Early Harvest Programme:** Early Harvest Programme basically consists of those projects which are to be implemented within short timeline. The projects under the Early Harvest Programme are as follows:
    1. IT Platform for Messages
    2. Government Greetings to be e-Greetings
    3. Biometric attendance
    4. Wi-Fi in All Universities
    5. Secure Email within Government
    6. Standardize Government Email Design

7. Public Wi-fi hotspots
8. School Books to be eBooks
9. SMS based weather information, disaster alerts
10. National Portal for Lost & Found children

There are numerous studies done to understand Digital India programme –

(Krishnaprabu S., 2019) S. Krishnaprabu says despite a few remarkable achievements, many more initiatives need to be undertaken. Public-private partnership models must be explored for sustainable development of digital infrastructure, as has been the case for civic infrastructure projects like roads and metro. The government should try to make additional spectrum available to telecom service providers for deployment of high-speed data networks. Moreover, startups need to be incentivized for the development of the last mile infrastructure and localized services and applications.

(Sharma, 2016) Sharma Jyoti says a digitally connected India can help in improving social and economic condition of people through development of non-agricultural economic activities apart from providing access to education, health, and financial services. However, it is important to note that ICT (Information and Communications Technology) alone cannot directly lead to overall development of the nation. The overall growth and development can be realized through supporting and enhancing elements such as literacy, basic infrastructure, overall business environment, regulatory environment, etc. The Digital India program is just the beginning of a digital revolution, once implemented properly it will open various new opportunities for the citizens.

(Borah B., 2020) In her study of Digital India, Borah B. (2020) stresses that digitization was need of the hour in order to make everything accessible digitally or electronically and hence, Digital India Mission was launched by the government of India in 2015. Her paper tries to give a brief understanding of the Digital India program, the visions, pillars, initiatives under the program, challenges faced in the implementation of the program and possible suggestions to achieve the desired goals. As a result of Digital India, digital literacy of India has improved. The Digital India program is likely to benefit citizens by generating employment opportunities, creating new chances regarding start-ups, quality of service delivery. The main objective of the program was to push digitization and connectivity as a vehicle for boosted economic growth. Even though the paper states that there are a lot of issues that the programme has experienced in execution, but at the same time it lauds the contribution it has made towards economy, health, governance sector making everything more transparent and closer to people. In conclusion, the paper suggests that the problems being faced in implementing Digital India can be resolved by creating awareness among the people, maximizing internet connectivity, improving skills in cyber security, participation of various departments and amendments in various relevant legislations.

2.2.4 Challenges of Digital India

Digital India programme has already passed seven years since its inception yet there are some challenges that it faces –

1. **Infrastructural barriers:** The rural areas especially scheduled areas in India are still have no means of instruments of ICT like mobile connectivity (Refer Image 1.1) which hurdles the Digital India programme.

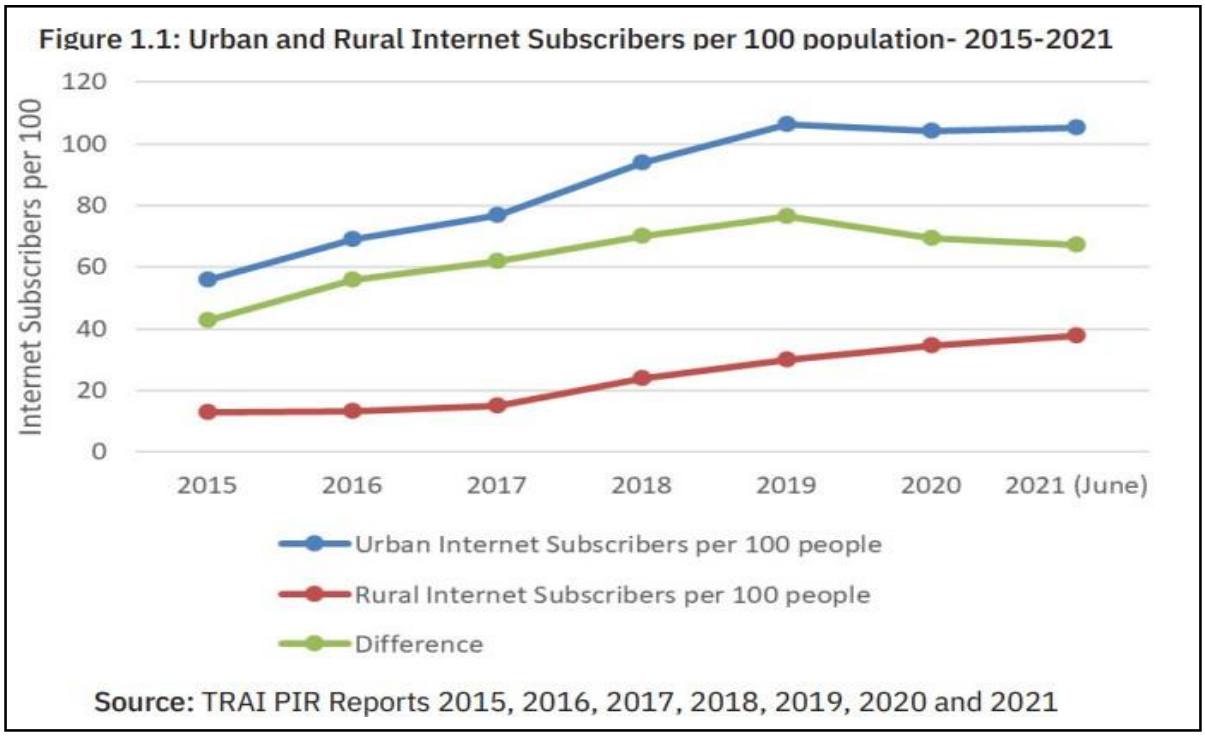

Figure 1 Urban and Rural Internet Subscribers per 100 population- 2015-2021, TRAI Reports, Taken from BIF Report

2. **Literacy and skill barriers:** The lack of skill in using computer and communication technology also prevents people from accessing digital information. In this way, the illiterate and unskilled people are not able to access the policies or programs of government which are available on internet like online applications, paying online bills, petition of online RTI etc.
3. **Economic barriers:** In developing country like India, cost is one of the important obstacles in the path of implementation of e-governance where major part of population is living below poverty line. It becomes very costly for the government to make digital accessibility for far flung and rural areas

4. **Regulatory roadblock:** Some of the common policy hurdles includes lack of clarity. The issues pertaining to taxation has proved to be roadblocks in advancing with the programme.
5. **Idle government RFPs:** Many Requests for Proposals (RFPs) issued by the government are not being taken by competent private sector organizations due to lack of commercial viability.
6. **Awareness:** Making digital India scheme known and creating awareness regarding digital literacy is itself a big challenge.
7. **Security:** There is cyber threat all over the globe and digital India will not be any exception. Hence there is a strong need of anti-cybercrime team which maintains the database and protects it round the clock.
8. **Inter Departmental Coordination:** Within the government there are various departments which should be integrated. Integration has technical as well as corporate issue. Corporate in the sense self-ego of the officers and staff of our government services are hurdle in the change. Also, the middleman policy will be eliminated completely because of digital India, hence there will be imminent resistance from the working staff.

(Dua, 2018) Dua through her paper states that Digital India campaign cannot be successful on its own. Policy changes are needed to make digital India a reality. Few of the suggestions are: Digital literacy is first step in empowering citizens. People should know how to secure their online data. To make this programme successful, a massive awareness programme must be conducted. There is pressing need to educate and inform the citizens, especially in rural and remote areas, about the benefits of internet services to increase the growth of internet usage.

(Bhat M, 2020)Muktar Ahmed in his paper analyzed that, Internet use has significantly increased in India over time, but there is still a digital divide in ICT use. There is a significant gap between rural and urban residents regarding Internet use along with the user's facing problem regarding connectivity problems. A digitally connected India can help in the overall growth and development of its citizens and this digital inclusion can be realized through supporting and enhancing elements such as basic infrastructure and digital literacy. This digital divide between technology's haves and have-nots threatens to exacerbate the gaps between the rich and poor, within and among countries. Unfortunately, in India all people have access to the Internet and ICT, and an amazingly large number of people especially from the rural areas does not have abilities to use the ICTs in a proper way and, therefore cannot draw the advantages from its usage.

2.2.5 Digitalization of Rural India

Digital India was launched with a well-defined objective of connecting rural India with high-speed internet network and broad band connectivity along with digital literacy. It is to ensure that government services are available to all citizens electronically on a single click on their mobile or smartphone or common service centers with one mission and target to take the nation forward digitally and electronically. The idea is to achieve digital innovation and create positive impact for the people living in rural areas.

Under the digital India initiative, the most crucial plan on which Government of India is working is "Digital Village." Under this plan, selected villages will transform to digital active village, less cash village so that rural people can perform their most of the activities through online mode only. The main objective of Digital Village scheme is to make village digital active. Under this

scheme, the work of different local institute of rural areas can be processed through internet only; every rural person will become digital literate.

(Vij, 2018) Dimple Vij in her paper says that Digital India can play a very big role, not only in empowering rural India but also empowering rural women who can access new opportunities, new markets through it and can get platform for their ideas and work. But to attain this government of India must implement Digital India Programme in its full sense. Starting IPPB from December 2018 is another good step to provide doorstep delivery of banking services to rural people and tribal through mail carrier when comes true in full sense will help in financial inclusion of rural India after Jan Dhan Accounts. Now Government is moving towards JAM (Jan Dhan, AADHAAR and Mobile) that is a good step towards fulfilling its objective of empowered India.

(ASHOK, Dr. M.L.& ABHISHEK N., 2018) Ashok and Abhishek in their paper states that the digital empowerment of the rural people is the immediate need of the hour for the economic development. Their study specifically find that the present scenario of Indian environment is most favorable for empowering the rural people digitally through various government initiatives like Digital India. In future the each and every rural citizen may become digitally literate. With the digital literacy rural people will gain new abilities and ways to participate and express themselves in a networked society. This will create that the way for inclusive growth of the economy. Thus finally, the study is concluded by saying that digital empowerment of rural people may function as a catalyst for the economic development by promoting a cashless as well as paper less environment.

2.2.6 Digital Education Initiatives by Government of India under Digital India Programme

Digital education has been significantly driven by the government's focus on strengthening digital infrastructure in the country, including providing internet connectivity in the remote areas. (KANTAR, 2021) According to IAMAI-Kantar Cube report, active internet users in India are estimated to reach 900 million by 2025, up 45% over 622 million active internet users in 2020. Also, internet penetration in the country is expected to reach >55% by 2025.
(IBEF, 2022) Digital Education Initiatives and their Purposes – Key initiatives taken by the Indian government to boost digital education activities are as follows:

National Digital Educational Architecture (NDEAR)

In the Union Budget 2021-22, the Indian government established the National Digital Educational Architecture (NDEAR) to strengthen digital infrastructure and support activities related to education planning. The NDEAR aims to offer distinct education ecosystem architecture for advancement of digital infrastructure in the country and guarantee autonomy of stakeholders, especially states and UTs.

PM eVIDYA Programme

The government introduced the PM eVIDYA programme in May 2020 to make e-learning more accessible for Indian students and teachers and promote & strengthen digital education in India. The programme aims to converge all activities related to online/digital education and is expected to benefit ~25 crore school students.

The programme will also encompass designing unique e-content for hearing and visually impaired students and offering radio/podcasts and QR-coded digital textbooks to school students (Classes 1 to 12) on the DIKSHA portal.

DIKSHA

In September 2017, the government introduced DIKSHA (Digital Infrastructure for Knowledge Sharing), a national portal for school education, to offer school curriculum-based engaging learning materials to students, teachers, and parents. The portal supports >18 Indian languages and has been implemented by 35 states/UTs.

SWAYAM

In 2017, the government launched Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) to offer an integrated platform for online courses at affordable costs to all citizens, especially the underprivileged section in the country.

The portal hosts Massive Open Online Courses (MOOCs) to offer quality education on various subjects for students (from Class 9-12 to Under Graduates and Postgraduates).

SWAYAM PRABHA

In 2017, SWAYAM PRABHA, a group of 34 DTH (Direct-to-Home) channels dedicated to broadcasting educational programs 24x7, was introduced.

The channels broadcast new content for a minimum of four hours every day, and this is repeated five times in the same day for students to select a convenient slot.

ePathshala Portal

In 2015, the government launched the ePathshala portal to build a resource store for educational videos, audios, flipbooks, etc. Resources on the portal are available in Indian languages such as Hindi, English, and Urdu and can be accessed via smartphones, laptops, desktops, and tablets.

NISHTHA

In FY21, the National Initiative for School Heads and Teachers' Holistic Advancement (NISHTHA) - Phase II was launched at the secondary level to tailor modules for online education. As per the Union Budget 2021-22, ~5.6 million teachers will be trained under the NISHTHA training programme in FY22.

OLabs

To offer students lab learning experience via the internet, the government introduced OLabs in November 2014 for those who do not have access to physical labs.

Virtual Labs

The Government of India introduced a pilot virtual lab in 2009 and the main one in 2010 to enable undergraduate and post-graduate students (pursuing science and engineering courses) remotely access the labs and enhance their study experience.

The virtual labs offer students a Learning Management System and various study aides such as video lectures, web resources, self-evaluation, and animated demonstrations.

Along with these, other digital initiatives taken by the government include Shiksha Vani for widespread use of radio, the Central Board of Secondary Education's (CBSE) podcast, sign language content on the National Institute of Open Schooling (NIOS) website/YouTube and Digitally Accessible Information System (DAISY) for accessing special e-content for hearing and visually impaired learners, and Free Open-source Software for Education (FOSSEE).

(Vara, N. L., 2016)N. Vara Laxmi in her paper states that there are so many ways to define e-learning and the educational approaches, e-learning is an innovative approach to learning. It is a holistic way of teaching and learning that meets the needs of today's digital natives. It is an environment made up of collaboration, choice, and an array of technological resources that supports a successful online learning experience. However, in order for learners to be successful in this learning environment the challenges to e-learning must be overcome with support and best practice solutions. Instructors and learners must embrace the shift away from traditional classroom practices to an e-learning approach to education. Even though today's learners are digital natives, the use of technology for e-learning can be overwhelming and provide student motivation challenges however, with the proper supports from instructors, learners can be successful within these e-learning environments. Finally, and probably the most important challenge for the instructor is to focus on the overall elements of a well-developed course. Developing a purposeful and well-defined online course, this supports the instructor and learner, means devoting the appropriate time and embedding the applicable course elements into the e-learning environment.

(Joshi & Goswami, 2016) Goswami in her paper states that successful implementation of Digital India Programme will involve lot of hindrances, but in the present global context there is no second thought. Therefore, it is highly expected to expedite the initiation of the digital India Programme.

2.2.7 COVID 19 and Digital Education in Rural India

(Pravat Kumar, Dr., J. , 2020)The pandemic COVID-19 has spread over entire world and compelled the human society to maintain social distancing. It has significantly disrupted the education sector which is a critical determinant of country's economic future. It was first identified in Wuhan, China on December 31, 2019. First death by COVID- 19 was the 61-year-old man in Wuhan, China on January 11, 2020. WHO declared COVID-19 as a pandemic on March 11, 2020? The first case of the COVID-19 pandemic in India was reported on 30 January 2020 in the state of Kerala and the affected had a travel history from Wuhan. It has affected more than 4.5 million peoples worldwide (WHO). According to the UNESCO report, it had affected more than 90% of total world's student population during mid-April 2020 which is now reduced to nearly 67% during June 2020. Outbreak of COVI-19 has impacted more than 120 crores of students and youths across the planet. In India, more than 32 crores of students have been affected by the various restrictions and the nationwide lockdown for COVI-19. As per the UNESCO report, about 14 crores of primary and 13 crores of secondary students are affected which are two mostly affected levels in India.

Due to the COVID-19 pandemic schools, colleges, universities, and other educational institutions were closed and all didactic efforts were moved toward the online environment, in an unprecedented effort to ensure the educational continuity. The Department of Higher Education under Ministry of Humanity Resource Development (MHRD) of Government of India had issued

a letter (21/03/2020 D.O.No.Secy (HE)/MHRD/2 020 DHE, MHRD) which suggests the stakeholders for the use of digital learning platform during this lockdown and quarantine time so that learning among students do not stop.

(India Oxfam, 2020) As per the report published by OXFAM India for education sector during pandemic, here are some key findings –

Private schools

1. Close to half the parents spend over 20% of their income on education
2. 9% parents were charged hiked fees despite the physical closure of schools and state guidelines restricting fee hikes
3. 15% parents were charged fees for uniforms despite schools being closed
4. Only 41% parents said that education was delivered during lockdown; WhatsApp was the most used medium of 'delivery'
5. 82% parents faced challenges in supporting their children to access digital education; Signal and internet speed were the biggest issues

Government schools

1. 35% children are not receiving mid-day meals despite government orders
2. 80% parents reported that education was not delivered during lockdown
3. 84% teachers struggle with delivery through digital mediums
4. Over 80% children have not received textbooks for the AY 2020-21
5. Schools unprepared to reopen – Over 40% schools being used as quarantine centers, have inadequate WASH facilities
6. Teachers fear that 30% students might not return after school reopens
7. Less than 1% teachers undertaking field duties are protected by insurance

Some other findings include-

1. There were 8 out of 10 parents that reported education was not delivered during lockdown.
2. 84% of the teachers reported facing challenges in delivering education digitally
3. 40% of the teachers fear that the prolonged school closure might lead to a third of the students not returning once schools reopens
4. 82% parents reported a combination of challenges in supporting their children to access education:
    a. Signal/internet speed issues- 53%
    b. Data is too expensive- 32%
    c. Do not have device-23%
    d. Difficulty in negotiating software- 19%
    e. No internet connection- 18%

Along with these challenges, various researchers have mixed opinions about pros and cons of education system. Here are some references -

(Pravat Kumar, Dr., J. , 2020) Pravat Kumar Jena in his paper states that India is not fully equipped to make education reach all corners of the nation via digital platforms. The students who are not privileged like the others will suffer due to the present choice of digital platforms. But universities and the government of India are relentlessly trying to produce a solution to resolve this problem. The priority should be to utilize digital technology to create an advantageous position for millions of young students in India. It is need of the hour for the educational institutions to strengthen their knowledge and Information Technology infrastructure to be ready for facing COVID-19 like situations.

(Kantipudi, P.,2021) Prasad in his article states that in India, due to the lack of computers and internet facility especially village citizens face problems in continuing their educations satisfactorily in the era of COVID-19. Many surveys show that even electricity facility is not completely available in many villages of India for all household applications.

(Kumar, 2021) Santosh Kumar in his paper says that even if the COVID-19 crisis lasts longer, there is an urgent need to work hard to maximize the use of online platforms to enable students to not only complete their degrees this academic year, but also prepare for the digital environment of the future. In this pandemic situation, the concept of "working from home" has greater relevance in reducing the spread of COVID19. India must develop creative strategies to ensure that all children have sustainable learning opportunities during the COVID-19 pandemic. Indian politics must include people from diverse backgrounds, including remote areas, marginalized and minority groups, to effectively provide education. Since online exercises are of great benefit to students, they should continue after being blocked.

(D, 2021) Hemalatha in her paper says COVID-19 is a major complication in the context of the government of India's commitment to educating every child on the basis of that; it is a fundamental right of every child. This Pandemic brought socio-economic problem and role of schools become crucial. The government launched an online class to address this problem. Online class experiments brought new perception and new warning stories about what works in education field. Online education fixed as an alternative to reduce the inequity. Online education opportunity is to be more selective in the working schedule.

2.2.8 Rural Education and Entrepreneurship

Considering the rural India, there lies endless opportunities for entrepreneurs, small businesses, Industrialists and other global players. While this practice has been well adopted by certain brands in the country like Meesho, Udaan, Agrostart etc., there still lies a huge market for innovative ideas.

In rural India, majority of the people are currently relying on agriculture, manufacturing, construction etc. for their daily livelihood.

(Center for Policy Research, 2021) As per Center of Policy Research the distribution of workforce is listed below:

Percentage of Employed Workers	**2017-18**	**2018-19**	**2019-20**
Agriculture	44.1	42.5	45.6
Manufacturing	12.1	12.1	11.2
Construction	11.7	12.1	11.6
Mining & quarrying	0.4	0.4	0.3
Electricity, water, etc.	0.6	0.6	0.6
Trade, hotels & restaurants	12	12.6	13.2
Transport	5.9	5.9	5.6
Other services	13.2	13.8	11.9
TOTAL	**100**	**100**	**100**

Table 2 Percentage of Employed Workers

Agriculture is the key employment sector in rural India and one of the main reasons behind this is lack of education. Though companies are continuously encouraged by the government for setting up businesses in rural districts of India, companies find it difficult due to lack of

infrastructure and talent. It is very hard for the companies to find educated resources for their jobs. Also, people from urban sector do not prefer to migrate to these remote areas due to lack of facilities and less pay.

Enhancing better education opportunities in rural sector can help in encouraging companies to set up offices in these areas, which results in increased profits and this overall boost economic growth.

There lie various opportunities for other sectors as well like –

1. **Education Startups** – The Indian education system has been facing hurdles in coping up with the pace of the digital revolution, especially for the unprivileged. Entrepreneurs should produce the solutions for the bottom-line students who cannot afford costly subscriptions. With little reduced margins than in urban, there lies huge market size and profits can be generated drastically. Also, with spread of education, increased people from basic jobs like agriculture to skilled jobs providing them with better earning and enhanced lifestyle. There are certain startups working in this domain like WhatsApp – based learning by ConveGenius, ThinkZone, Veative Labs and Eduauraa. But still there lie huge opportunities for other startups and established brands to flourish.
2. **Tourism** – While people living in urban cities and other part of the world wants to explore diverse cultures and lifestyles of people living in rural parts of the country, there lies huge opportunities for setting up hotels or homestays, becoming a local guide etc. With basic education and digital knowledge, people in rural India can be connected to the world and with people looking for these experiences.
3. **Research and Training Institutes** – Setting up research and training institutes both physical and digital for farmers and unskilled labors can help them yield better on farm.

Providing education on what crops to choose what techniques to use etc. can help farmers perform better on the field. This will lead to reduced crop failure, time saving and better crop yield, which in turn will increase country's overall GDP.

Like these businesses there lie an extensive list of other possible opportunities, with numerous benefits to the economy. Some of these are –

1. **Reduction in migratory workforce in search of jobs** – Rural entrepreneurship can fill the big gap and disparities in income rural and urban people. Rural entrepreneurship will bring in or develop infrastructural facilities like power, roads, bridges etc. It can help to check the migration of people from rural to urban areas in search of jobs.
2. **Balanced regional growth** – Rural entrepreneurship can dispel the concentration of industrial units in urban areas and promote regional development in a balanced way.
3. **Promotion of artistic activities** – The age-old rich heritage of rural India is preserved by protecting and promoting art and handicrafts through rural entrepreneurship. It can also be taken online through good knowledge of e-commerce amongst people in rural sector.
4. **Enhanced Standard of Living** – With good education and decent paying jobs, the standard of living of people in rural India will also increase. This in return will increase their spend capacity and enhance GDP.

Considering the benefits and opportunities, there lies a big need to understand the current status of Digital Education in rural India so that necessary plans and policies can be formulated according to the needs and current situation.

2.2.9 Summary of the Literature Review

Through the literature review it has been noted that the government has taken a huge step for the education sector in India. The flagship dream project of Shri Narender Modi Ji (Prime Minister of India) has a great vision to transform the lives of people in India for both rural and urban population. There are several programs launched under this scheme for the benefit of the society including digital village, DIKSHA, SWAYAM, e- governance etc.

COVID 19 has hit globally and has impacted every part of the world. India is also undergoing through the challenges that this pandemic has brought along. Due to the COVID-19 pandemic schools, colleges, universities, and other educational institutions were closed and all didactic efforts were moved toward the online environment, in an unprecedented effort to ensure the educational continuity. But this model was little easy to adapt in urban areas than in rural areas. There are several reasons behind it –

1. Lack of availability of resources
2. Lack of awareness of educational importance
3. Less availability of schools
4. Financial condition
5. Gender Divide

The findings from initial review states that, though successful implementation of Digital India Programme will involve lot of hindrances, but in the present global context there is no second thought. Also, the programme like Digital India is an absolute need in boosting up the educations sector currently. Considering the situation of Rural India, it is a need of an hour to understand how seven years of this programme has impacted the life of people in rural India and how

education sector is being benefited currently. Also, it would be important to note that what all improvements can be brough in to make this programme a success.

CHAPTER III:

METHODOLOGY

3.1 Overview of the Research Problem

Education holds immense importance in society and plays a crucial role in individual and societal development. (Kapur, 2023)Education leads to progression of individuals; promotes enhancement of skills and abilities; leads to up-gradation of motivation levels; facilitates in reinforcing contacts; enables individuals to emerge into moral and productive human beings; enables individuals to promote family and community well-being; prepares individuals for employment opportunities; prepares individuals to face challenges; promotes enhancement of personality traits and leads to up-gradation of overall living conditions. Therefore, it can be stated, when importance of education is acknowledged, individuals are able to contribute efficiently in sustaining their living conditions in an effective manner. This is well known by all that education buids the backbone for every country. Keeping this in mind the Government of India launched Digital India Programme in 2016 under the leadership of Prime Minister.

The Digital India Programme was initiated to empower Indian society digitally and promote a knowledge economy. There were various programmes launched under Digital India programme for education sector in India by Government of India including DIKSHA, NDERA, SWAYAM, e- Pathshala etc. These initiatives were designed to leverage digital technologies and provide access to quality educational resources, enhance teacher effectiveness, and facilitate a more inclusive and equitable education system in India under the Digital India Programme. Also, with the COVID-19 pandemic, the significance of digital infrastructure and online education became even more crucial, especially in rural areas. However, they were various factors including Infrastructure, Digital divide, Language and content relavence etc, the programme was unable to reach to wider audience especially in Rural India. Therefore, the research problem seeks to analyze how effective the Digital India Programme has been in bridging the digital divide and improving access to quality education in rural India during and after the COVID-19 crisis.

3.2 Operationalization of Theoretical Constructs

(Carrasquillo, 2022) Operationalization pertains to the experimental aspect of the scientific method. After creating a hypothesis and making a relevant prediction, a researcher must design an experiment that will generate data that the researcher will utilize to prove or refute their hypothesis. Operationalization is essential to any experimental plan because this process allows researchers to define relevant variables and observations as well as measure certain concepts. The term "operational definition of a variable" means the general and universal definition of all objects or phenomena being compressed into content, form, and scope that can be observed and measured in the activities of research.

In the research on understanding Effectiveness of Digital Education in Rural India, there would be some theoretical constructs that seems relevant –

3.2.1. Digital Infrastructure: Refers to the availability and quality of digital technologies, internet connectivity, devices, and related infrastructure in rural schools.

3.2.2. Access to Online Education Platforms: Refers to the extent to which rural students have access to online education platforms and digital resources for learning.

3.2.3. Digital Literacy: Refers to the level of skills, knowledge, and capabilities of teachers, students, and parents in using digital technologies for educational purposes.

3.2.4. Quality of Digital Education: Refers to the effectiveness, engagement, and learning outcomes associated with the utilization of online education platforms in rural areas.

3.2.5. Government Support: Refers to the extent of government policies, funding, and initiatives to promote digital education and bridge the digital divide in rural India.

These are certain indicators and operational definitions –

Area	Indicator	Operational Definition
Digital Infrastructure	Internet connectivity	Percentage of rural schools with reliable internet connectivity for digital education
Access to Online Education Platforms	Access to device and Device ownership	Percentage of rural students with personal devices (e.g., smartphones, laptops, tablets) to access online education platforms
Digital Literacy	Digital Skills	Assessment of teachers', students', and parents' proficiency in using digital tools, navigating online platforms, and accessing digital resources
Quality of Digital Education	Engagement level	Surveys or interviews assessing students' and teachers' level of engagement with online education platforms and resources
Quality of Digital Education	Learning outcomes	Assessments or tests measuring students' academic

		progress or knowledge acquisition through digital education platforms
Government Support	Funding allocation	Analysis of government budgets and allocations specifically designated for digital education initiatives in rural areas

Table 3 Areas Indicators and Operational Deficiency in Providing Digital Education

For the analysis both primary and secondary methods of data collection are used. Data collected from both these sources forms the basis of this research.

3.3 Research Purpose and Questions

The long-term goal of the research is to help policy makers and the government to take appropriate steps and actions to make the digital India programme a success. Also, since the programme aims at various sectors of development including infrastructure, lifestyle, health, education etc, with this paper it would provide the deep down analysis of how impactful the programme has been in the different parts of the country for the education sector, specifically, rural India. Particularly, the study has the following sub-objectives:

1. To provide a comprehensive review of challenges currently faced in implementation of Digital India Programme.
2. To provide better insights on the impact of Digital India Programme for the education sector in rural India.
3. To see how the rural education sector of India dealt during the pandemic and Is rural India ready for next pandemic.

4. To highlight what all could be the possible measures, solutions and innovation ideas government can adopt in the education sector using digital India programme.

The purpose of research in the effectiveness of digital education in rural India during COVID-19 is to gain insights into the challenges and opportunities presented by the pandemic and the shift to digital education in rural areas. Specifically, such research can help to:

1. Understand the impact of digital education on learning outcomes: Research can help to evaluate the effectiveness of digital education in maintaining or improving learning outcomes in rural areas during the pandemic. This can inform future policies and interventions to support digital education in rural areas.

2. Identify barriers and challenges to digital education in rural areas: Research can help to identify the specific challenges and barriers that prevent effective implementation of digital education in rural areas during times of crisis, such as the COVID-19 pandemic. This can inform the development of strategies to address these challenges and promote equitable access to digital education.

3. Determine the most effective approaches for delivering digital education in rural areas: Research can help to identify the most effective approaches for delivering digital education in rural areas, including teacher training, curriculum development, and the use of appropriate technology. This can inform the development of effective interventions to support digital education in rural areas.

4. Assess the impact of the digital divide on education outcomes: Research can help to evaluate the impact of the digital divide on education outcomes in rural areas during the pandemic. This can inform policies and interventions to reduce the digital divide and promote equitable access to digital education.

5. Identify best practices for remote learning: Research can help to identify the best practices for remote learning in rural areas during the pandemic. This can include strategies for engaging students, supporting teachers, and ensuring effective use of technology.

6. Evaluate the effectiveness of existing digital education initiatives: Research can evaluate the effectiveness of existing digital education initiatives in rural areas and identify areas for improvement. This can inform the development of more effective digital education programs in rural areas.

7. Understand the impact of digital education on equity: Research can help to understand the impact of digital education on equity in rural areas during the pandemic. This includes assessing whether digital education exacerbates existing inequalities or whether it can be used to promote greater equity in education.

8. Identify the most effective ways to involve parents and the community: Research can identify the most effective ways to involve parents and the community in digital education initiatives in rural areas during the pandemic. This can help to ensure that these initiatives are sustainable and effective in the long term.

Overall, research on the effectiveness of digital education in rural India during COVID-19 can help to inform policy and practice in education, particularly in the context of remote and distance learning. It can provide insights into the challenges and opportunities presented by digital education in rural areas and guide the development of effective strategies to promote equitable access to education.

The reseach questions includes –

1. What are the challenges faced by the rural education sector in implementing the Digital India Programme?
2. To what extent has the Digital India Programme been successful in Rural India?
3. What are the perceptions of rural students, teachers, and parents towards the Digital India Programme?
4. How has the pandemic affected the education sector for rural students and teachers?
5. What measures can be taken to improve the implementation and effectiveness of the Digital India Programme in rural education?
6. What all businesses can be developed as the benefit of this programme?

3.4 Research Design

To answer the reseach questions both Qualitative and quantative methods of research shall be used. (Kothari, 2004)Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind.

For studying the effectiveness of the Digital India Programme in rural India post-COVID analysis, a combination of qualitative and quantitative research methods is employed. This mixed-methods approach allows for a comprehensive understanding of the research problem by capturing both numerical data and qualitative insights.

Qualitative Research Methods:

1. **Interviews:** Conducted in-depth interviews with key stakeholders such as educators, students, and parents in rural areas. These interviews provided rich insights into their experiences, perceptions, challenges, and suggestions regarding the Digital India Programme.
2. **Observations:** Engaged in direct observations of digital education activities in rural schools. This method allowed to observe the actual utilization of digital technologies, teacher-student interactions, and the overall classroom environment, providing contextual insights.

Quantitative Research Methods:

1. **Surveys/Questionnaires:** Administering structured surveys or questionnaires to a representative sample of rural students, teachers, and parents. The survey included questions related to access to digital infrastructure, usage of online education platforms, digital literacy levels, and perceptions of the Digital India Programme's impact.
2. **Existing Data Analysis:** Analyzed secondary data sources, such as official reports or data from government sources, to assess trends, policy implications, and quantitative

indicators related to the Digital India Programme's implementation and impact in rural areas.

Integrating Qualitative and Quantitative Data:

After collecting qualitative and quantitative data separately, findings were integrated. This integration involved comparing and contrasting the results, triangulating the findings, or merging the insights to gain a comprehensive understanding of the research problem. This mixed-methods approach allowed for a more nuanced understanding of the effectiveness of the Digital India Programme, complementing data with real-life experiences, perceptions, and contextual factors from qualitative research.

3.5 Population and Sample

(Kothari, 2004) All items in any field of inquiry constitute a 'Universe' or 'Population.' A complete enumeration of all items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observation increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Therefore, when the field of inquiry is large, this method becomes difficult to adopt because of the resources involved. At times, this method is practically beyond the reach of ordinary researchers.

This study population included all the people residing in rural India (~65% of India's population) which is around 90Mn. For this study to take place sampleling methods were adoped. This included Cluster sampeling and Convenience sampling. (Kothari, 2004) Cluster and convenience Sampeling - If the total area of interest happens to be a big one, a convenient way in which a sample can be taken is to divide the area into a number of smaller non-overlapping areas and

then to randomly select a number of these smaller areas (usually called clusters), with the ultimate sample consisting of all (or samples of) units in these small areas or clusters.
In this case, I divided the population into clusters (e.g., districts or villages) and randomly selecting clusters. Then, all individuals within the selected clusters would be included in the sample.

The population of interest for this study were rural population including Students, teachers, school staff, digital assets providers etc. (Qualtrics, n.d.) The sample size comes to approx. 385 samples, assuming a 95% confidence level, .5 standard deviation and a margin of error (confidence level) of +/- 5%. To get good insights the surver was conducted in 12 states of India and 487 students were asked to fill the survey.

The list of states includes –

Assam	Bihar	Delhi	Haryana
Himachal Pradesh	Uttar Pradesh	Madhya Pradesh	Rajasthan
Uttrakhand	Odisha	Punjab	Tamil Nadu

Table 4 States and UT were reseach was conducted

3.6 Participant Selection

Participant selection in this research on the effectiveness of the Digital India Programme in rural India post-COVID analysis involves identifying and selecting individuals who will participate in the study. The selection of participants was guided by the research objectives, sampling strategy, and the characteristics of the population under investigation. Key considerations for participant selection are listed below-

1. **Stakeholders:** Key stakeholders who are directly involved or affected by the Digital India Programme in rural areas are students in those areas. The students were provided with survey forms and were asked them to fill with full authenticity.

2. **Sampling Strategy:** The sampling strategy was defined based on the research design and objectives. Instead of using random sampling, cluster, and convenience sampling methods were used. For the data collection villages and districts from different parts of India were selected and the survey was floated.
3. **Inclusion Criteria:** Specific criteria for participant inclusion were established to ensure that the target audience meet the desired characteristics and relevance to the research objectives. Students from the age group of 5-17 were considered for this survey. Factors such as geographic location (rural areas), accessibility, and educational level were considered.
4. **Consent and Ethical Considerations:** Informed consent from participants were taken before their inclusion in the study. It was ensured that all the ethical guidelines and protocols were followed to protect participant privacy, confidentiality, and well-being. Ethical guidelines and necessary approvals from relevant institutions were obtained beforehand.
5. **Representation:** Diversity and representation within the selected sample was strived for. Factors such as geographic diversity, socioeconomic backgrounds, gender, age groups, and educational levels were ensured to get a comprehensive understanding of the effectiveness of the Digital India Programme in rural India.
6. **Recruitment Process:** Clear and systematic process for recruiting participants was developed. This involved collaborating with educational institutions, Anganwadi, and NGOs to identify and invite potential participants. Clear information about the research objectives, procedures, and voluntary participation was provided.
7. **Data Saturation:** (Bowen, 2008)Data saturation refers to the point in the research process when no new information is discovered in data analysis, and this redundancy signals to researchers that data collection may cease. It was ensured to the point at which no new information or themes emerge the data shall be collected. Data saturation helped determine that an adequate sample size has been achieved.

By carefully considering participant selection, it was ensured that the selected participants represent the population of interest, provide diverse perspectives, and contribute to the overall validity and reliability of the research findings.

3.7 Instrumentation

Data collection concerns obtaining the essential details of the study phenomenon, and it includes observing the participants' feelings, emotions, and thought processes. This data was extracted through primary and secondary methods. The study used the surveys and observations as the primary source of data to get a general overview of how effective was Digital India programme in Rural India. The primary methods were collected through surveys by physically visiting the location and getting this survey filled out and by observing the behaviour in Rural India. The secondary method reviewed documents, government websites, and academic journal articles. It enabled to focus beyond the literature on the problem of interest in the study.

(Yavuz, 2023) In survey research, we use sampling techniques to collect data from a group of people. This allows us to get a snapshot of what is happening in that group. Quantitative survey research has the following three characteristics: (1) A survey is a way to gather data about a group of people. This data can tell you things like how many people there are, what their ages are, and what kinds of things they like. (2) Quantitative surveys involve collecting data from people, which means that the results can be subjective. (3) Quantitative survey research involves selecting a small number of people from the larger population to study. This helps to provide information that can be used to generalize to the larger population. Hence in this reseach, there is a reliance on survey collection as the population is huge and it is impossible to study the entire population with accuracy.

(Goodfellow, 2023) states that surveys provide evidence for the social sciences for knowledge, attitudes, and other behaviors, to quantify qualitative research and to assist in policymaking. A

survey-designed research project is about asking questions of individuals, and, from the answers, the researcher can generalize the findings from a sample of respondents to a population. The similar approach has been used in this reseach, questions have been asked from indivisuals and on the basis of answers certain key general themes are gathered which are forming the basis for analysis.

In this research along with survey lot of online documents have been reviewed including policies, research, and census data. But to get a clear picture observation in rural areas have been done and interviews with the authorities are taken over telephone.

(Fraenkel et al., 2012) in their book stated that certain kinds of research questions can best be answered by observing how people act or how things look. For example, researchers could interview teachers about how their students behave during class discussions of sensitive issues, but a more accurate indication of their activities would probably be obtained by actually observing such discussions while they take place. The degree of observer participation can vary considerably. There are four different roles that a researcher can take, ranging on a continuum from complete participant to complete observer. Hence instead of just directly asking questions from teachers or the authorties, direct observation method was used in the reseach. When physically visiting the site of study – School, NGO and Aanganvadi, it was observed about the actual situation of the environment in school, infrastructure avaialble to students, condition of schools, access to technology and knowledge of the teacher. All these information would not have been possible to get via Interview as there can be biases in the response.

While conducting observations as part of the research on the effectiveness of the Digital India Programme in rural India post-COVID analysis, a checklist was prepared to systematically observe. This checklist included –

1. Understanding the physical environment where the observation took place, including the specific rural school/ classroom.

2. Understanding the demographic characteristics of the participants being observed, including the number of students, their age range, and other relevant background information.
3. Objectives of the research were stated clearly including understanding the utilization of digital resources, teacher-student interactions, and student engagement levels.

Few other factors were also observed during the research-

1. **Teacher Digital Pedagogy:** It was observed how teachers were teaching in the class and whether were they integrating digital tools into their teaching methods.
2. **Student Interaction:** It was observed how students interacted with each other during the class and if they are understanding with what the teacher was teaching.
3. **Classroom Environment:** The classroom environment was assessed, including the arrangement of furniture, availability of resources, and student behavior during classroom activities.

Using an observation method checklist helped ensure consistent and systematic data collection during the observation process.

While observation method was one of the key to this reseach, certain in-person converstation with the authories helped to gather better insights on how effective is the Digital India programme in rural India. (Patton, 2002) Patton has mentioned in his book that we interview people to find out from them those things we cannot directly observe. The issue is not whether observational data is more desirable, valid, or meaningful than self-report data. The fact of the matter is that we cannot observe everything. We cannot observe feelings, thoughts, and intentions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people questions about those things.

To achieve the validity of the study, all the documents (Survey) were digitally stored and preserved in a secured place to protect the confidentiality of the interviewees as enshrined in the University's ethical standards and the signed consent form to mitigate bias.

3.8 Data Collection Procedures

For the purposes of the study, qualitative data were gathered through semi-structured interviews and Observations and quantitative data were gathered through questionnaire. The researcher collected the responses from October 2022 to May 2023. The data was collected by physically visiting the remote villages in India and by taking help of authorities including NGO's, Anganwadi and teachers teaching in the remote areas. All the data was either collected in hard copies on a printed sheets or via google forms wherever possible and later was added in Excel.

3.8.1. Semi Structured Interviews

Semi-structured interviews are common ways of gathering qualitative data. While considering the semi-structured interview, the researcher evaluated several types of interviews and reached into the conclusion that semi-structured interview would be best suited for this study.
Semi-structured interviews were aimed at authorities including owners of NGO's, teachers in schools in Remote villages in India, and digital education providers. 5 people were selected for the semi-structured interviews as part of qualitative research methods.
In semi-structured interviews, the themes and questions are known in advance, but the order and discussion of these questions is dependent on the interviewer's decision. All the interviewees selected for the study were given the details of the themes of the interview in advance which allowed them to prepare. The researcher explained the purpose of the study and also explained how the information obtained will be used and assures respondents of confidentiality. Further, the researcher arranged the questions in such a way that it will start with general questions and

then to specific questions about the effectiveness of the Digital India Programme in India and hoe education happened during COVID-19.

In terms of conducting the interviews, the researcher used computer-assisted interviews using telephones. The researcher used a digital recording device, and the tape was transcribed and stored safely. This process ensured the natural flow of conversation. Participation to all the above were completely voluntary and interviewees were informed of confidentiality and the right to pause, stop, or withdraw from the interview at any point. The participants were made aware that participation was voluntary and were provided with a 'participant information sheet' in advance of the participation.

3.8.2. Observation Method

While conducting observations as part of the research on the effectiveness of the Digital India Programme in rural India post-COVID analysis, a checklist was prepared to guide the systematic observation process (Listed in section 3.7).

Using an observation method checklist helped ensure consistent and systematic data collection during the observation process. It enabled the researchers to focus on specific aspects of interest, record relevant observations, and enhance the reliability and validity of the gathered data for analysis and interpretation.

3.8.3. Surveys

A questionnaire/ Survey is an efficient method for data collection and is a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives. The questionnaire survey was undertaken during the course of research with a target population of 487 students from 12 states of India (All remote villages).

Format of a Survey:

Surveys are a commonly used research tool that involves asking participants a series of questions to gather information about their opinions, beliefs, attitudes, behaviors, or demographic characteristics. Surveys were conducted using various formats, including:

1. **Paper-Based Surveys:** Participants received a physical copy of the survey questionnaire and provide their responses on paper.
2. **Online Surveys:** Participants completed the survey electronically through web-based platforms (Google Forms). Online surveys offered convenience, ease of data collection, and the ability to reach a larger audience.

Benefits of Surveys:

Surveys offer several benefits that made them a valuable research tool in studying the effectiveness of the Digital India Programme in rural India post-COVID analysis:

1. **Efficient Data Collection:** Surveys allowed the researchers to collect data from a large number of participants efficiently. They provide a standardized format for data collection, ensuring consistency across responses and ease of data analysis.
2. **Quantitative Data:** Surveys generated quantitative data, which can be analyzed statistically. This allowed for statistical inference, identifying patterns, correlations, and trends in participants' responses.
3. **Versatility:** Surveys were designed to capture a wide range of information, including participants' experiences, opinions, perceptions, satisfaction levels, or demographic characteristics.
4. **Cost-Effectiveness:** Surveys were the most cost-effective data collection method. Online surveys, in particular, eliminate the need for printing and mailing costs, reducing expenses.
5. **Anonymity and Confidentiality:** Surveys provided a level of anonymity and confidentiality to participants, allowing them to express their views honestly and openly.

6. **Large Sample Sizes:** Surveys were able to reach a larger and more diverse population. This enabled the researchers to generalize findings to a broader population, increasing the external validity of the research.
7. **Comparability:** Surveys allowed for easy comparison across different groups, time points, or variables. Researcher was able to compare responses from different demographic groups and evaluate the impact of numerous factors on participants' perceptions.

3.8.4. Secondary research

In this research on understanding the effectiveness of the Digital India Programme in rural India post-COVID analysis, secondary research played a crucial role in providing a foundation of knowledge and context. The secondary research included –

1. Undergoing a comprehensive literature review on the Digital India Programme, rural education, and related topics. This involved reviewing academic papers, reports, case studies, and relevant publications to understand the existing knowledge, theories, and findings in the field.
2. Examining official reports, policy documents, and publications by government bodies or agencies involved in the Digital India Programme. These sources provided insights into the objectives, strategies, implementation progress, and evaluation findings of the program.
3. Analyzing previous research studies that have explored aspects related to digital education, technology integration, access to digital resources, or educational outcomes in rural areas of India. This helped in understanding the challenges, successes, and impact of digital initiatives in rural education.
4. Reviewing news articles, online resources, blog posts, and social media discussions related to the Digital India Programme and its impact on rural

education. These sources provided real-time perspectives, community experiences, and public opinions on the program.

All these methods combined helped in completing this research. Also, to avoid the demerits of collecting documents such as edited documents that lose literal meaning or exposure to confidentiality infringement, the study collected data and ensured member controls to establish a proper understanding and validity of the data collected.

3.9. Data Analysis

Data analysis in the research on understanding the effectiveness of the Digital India Programme in rural India post-COVID analysis involves processing and interpreting the collected data to draw meaningful conclusions and address the research objectives. Here are some key techniques involved in data analysis under each data collection method –

1. **Interview -**

The interview data were collected by using a recording device. After producing the transcript for interviews, a summary of key points was identified. From this summary, key themes were generated.

The process for an interview and Analysis is described below –

Figure 2 Process in an Interview and Analysis of the themes

To analyze the qualitative data received in interview transcripts technique including thematic content analysis was used. It helped in identifying patterns, themes, and key insights that emerge from the qualitative data.

(Anderson, 2007) Thematic analysis is an intuitive approach to qualitative data analysis that allows researchers to explore patterns across their data. It involves identifying and understanding

key themes in the data and how they relate to one another. “Themes” are overarching categories of common information related to a research phenomenon, which tells a story about its dimensions.

2. **Questionnaire –**

The questionnaire was collected using physical copies and online mediums and was analyzed using statistical methods. The completed responses were added to the online medium and then downloaded and imported into an Excel sheet that allowed easy interpretation of findings. Using visual graphs (Bar graphs, histograms, maps, and pie charts), the results from the quantitative data questions were analyzed.

Once the data was collected in tabular form, Mode was taken for some of the answers to understand which among all the options is repeating maximum times. Along with this Weighted mean was used at one place.

(Kothari, 2004) Mode is the most commonly or frequently occurring value in a series. The mode in distribution is that item around which there is maximum concentration. In general, a mode is the size of the item which has the maximum frequency, but at items such an item may not be made on account of the effect of the frequencies of the neighboring items. It is useful in all situations where we want to eliminate the effect of extreme variations. Mode is particularly useful in the study of popular sizes.

(Kothari, 2004) Mean is the simplest measurement of central tendency and is a widely used measure. Its chief use consists in summarising the essential features of a series and in enabling data to be compared. It is amenable to algebraic treatment and is used in further statistical calculations. It is a relatively stable measure of central tendency.

In case of a frequency distribution, we can work out mean in this way:

$$\overline{X} = \frac{\sum f_i X_i}{\sum f_i} = \frac{f_1 X_1 + f_2 X_2 + \ldots + f_n X_n}{f_1 + f_2 + \ldots + f_n = n}$$

Sometimes, instead of calculating the simple mean, as stated above, we may workout the weighted mean for a realistic average. The weighted mean can be worked out as follows:

$$\bar{X}_w = \frac{\sum w_i X_i}{\sum w_i}$$

Where $\bar{X}_w$ = Weighted item

w_i = weight of ith item X

X_i = value of the ith item X

Visual graphics in data analysis –

1. **Bar Graph –** (Vasavi et al., 2021) A Bar graph helps to visualize categorical data. It represents the data using bars where its size varies proportionately with the value of the data. Typically, the higher the value, the more significant is the size of the bar. Bar graphs are used for quantitative analysis between different groups because they allow the analyzer to recognize patterns and trends quickly.
2. **Histograms –** (Vasavi et al., 2021) Histograms represent the distribution of continuous numeric data for a single quantitative variable like age, weight, marks, COVID cases, and many more. In histograms, total distribution is divided into several bins; the width of the bin plays a vital role in the histogram. The size depends on the data associated with that particular bin. Greater the bin width, the smaller the number of bins, and vice versa.
3. **Pie Chart –** (Vasavi et al., 2021) A pie chart is used to visualize categorical data. It is visually represented in a circular shape; A pie chart is divided into slices of various sizes, each slice representing a numerical proportion of data of a certain kind.
4. **Maps –** (Vasavi et al., 2021) Map visualization is used for analyzing geospatial data and visualizing it as maps. This type of data presentation is more straightforward and intuitive. The distribution or proportion of data in each region is seen graphically.

The data was collected through personal one-on-one semi-structured interviews and survey forms to the study respondents. All the collected data that will form the interviews, surveys, documents and direct observation will be triangulated to form final analysis.

3.10. Research Design Limitations

(Theofanidis & Fountouki, 2018) Limitations of any particular study concern potential weaknesses that are usually out of the researcher's control, and are closely associated with the chosen research design, statistical model constraints, funding constraints, or other factors. In this respect, a limitation is an 'imposed' restriction that is therefore essentially out of the researcher's control. Still, it may affect the study design, results, and ultimately, conclusions and should therefore be acknowledged clearly in the paper when submitted. While most of the factors are out of control yet care was taken to minimize the limitations and maximize the reliability and validity of findings.

The study has limitations in terms of sample size given the huge size of the population, which might affect the generalizability of the findings. A small sample size was chosen which might not adequately represent the diversity and characteristics of the entire rural population in India. Additionally, certain groups within the population, such as marginalized communities or remote regions, may be underrepresented in the sample. Though a diverse group of population sample was taken into consideration, there might be chances that some of the primitive remote villages where even the basic infrastructure including road and electricity is not available were not considered.

The sampling method used might have introduced bias and affected the external validity of the study. For example, since convenience sampling was employed, participants who were more easily accessible or willing to participate were selected.

Participants' responses, particularly in surveys or interviews, might be subject to recall bias, where their ability to accurately remember and report past events or experiences may be influenced by memory limitations or subjective interpretations.

The interview process provided certain limitations such as the quality of the data as it depends upon the interaction between an interviewer and the interviewee and may vary with respondents. To limit this, control was maintained by asking relevant questions, listening with care to assess the quality of responses, and giving feedback to the interviewee.

There were limitations due to time and travel constraints, which could have affected the depth and breadth of data collection, analysis, and interpretation. However, appropriate time was given to travel to different parts of the country to avoid this limitation.

3.11 Ethical Considerations

Ethics is the code of behavior in relation to the rights of those who became the subject of the work or are affected by it. The ethical considerations observed in the study are as follows:

1. Permission was gained from each participant beforehand and the purpose for the participation was made clear. Each participant was treated with respect and confidentiality was maintained.
2. All the personnel participating in this research study was treated fairly and was given equal opportunity during the survey and to respond to the questionnaire.
3. The main ethical consideration was confidentiality. This was addressed by having an introductory cover letter requesting permission outlining the research background including the research ethics.
4. The researcher also adhered to University's ethical standards.
5. All the data collected from students and via Interviews as part of the research was stored electronically with proper encryption, where one central master record was created.

As ethics is fundamental to this study, the researcher acted appropriately to ensure the participants were anonymous for their current level of engagement. The main consideration adopted is as follows:

1. Numbers and addresses were not used in any data obtained.

2. As this was a voluntary online survey, participants had the choice to participate in the survey.
3. As no translators or transcribers, or any other third parties were used in this study, no one other than the researcher have access to the data and thus full confidentiality was maintained.

3.12 Conclusion

The chapter discussed the qualitative and quantitative analysis process and the rationale for using interviews and observation methods as necessary to analyze the effectiveness of the Digital India programme in rural India – A post-COVID'19 analysis.

The methodology section examined and justified the aims and objectives outlined in the introduction and interferences were made from the results of the questionnaire survey and the interviews conducted. To achieve the research, aim and objectives, both qualitative and quantitative methods of research have been adopted. It also provided justification for all the tools and instruments that were used for the research. The reliability and validity of the findings were also discussed.

CHAPTER IV:

RESULTS

4.1. Introduction

This section of the thesis focuses on the finding of the research and presents an analysis and discussion of the results that are built based on the responses of the interviews, observations, and questionnaire survey. The researcher collected the responses from October 2022 to May 2023. For interview, the researcher used semi-structured interview method as mentioned in chapter 3. Semi-structured interviews were conducted with 5 people including 1 parent, 2 teachers in remote area, 1 NGO head and 1 Anganwadi lead. The researcher also noted various observations during visit to villages. These findings are listed below in section 4.3.

A response rate of 69.2% was achieved by sending questionnaire and physically visiting the villages to 700 students across India. The researcher felt that the response rate was considerably good particularly the researcher was managing villages and remote areas where internet access was not always accessible. Despite the challenges faced, researcher used various methods including sending physical copies of the forms, creating google forms and planning physical visits. Along with this some key observations were also made when villages were visited physically.

The chapter has two main sections which describes qualitative and quantitative data analysis. The main results derived from qualitative and quantitative methods are discussed below.

4.2. Qualitative Data Analysis

This area includes the main themes derived from semi-structured interviews. The researcher conducted semi-structured interviews with five (5) stakeholders including two (2) teachers, one (1) NGO head, one (1) Anganwadi, and one (1) parent to get their view on the effectiveness of the Digital India programme in Rural India and how education happened during COVID. There

were mostly negative responses. Some of the key themes and challenges that came out of these discussions were poor infrastructure, lack of understanding of the program among teachers, students, parents, and other stakeholders, and the impacts of COVID on education in students in rural India. Key themes derived from this study are listed below –

4.2.1. Poor Infrastructure

When asked about how is the infrastructure in the villages various responses were received. The these generated from these interviews along with the context of information gathered is listed below –

Infrastructure	Participants	Responses
Electricity	Teacher 1	The school does not have a continuous supply of electricity. It might come for 1-2 hours one day and then again not for hours next day.
	Teacher 2	We do not have electricity for even running fans and lights in schools, how can we run computers or other digital devices?
	Parent 1	There is limited electricity in the village. The electricity is provided for just approx. 4-5 hours a day. During this time, we utilize electricity for irrigating our farm and doing other activities in the farm.
	NGO Head	We are trying to set up a computer lab in our NGO which will run on UPS since electricity is a major issue.
	Anganwadi head	We still instruct students under a semi-structured hut, setting up the digital device is a far-fetched dream.

Table 5 Infrastructure Issues as noted in Interview (Electricity)

Infrastructure	Participants	Responses
Digital Devices	Teacher 1	I have a cell phone, but it is not smart. But some of the families in our villages do not even have a telephone.
	Teacher 2	Students do not use smart devices; families do not have money to purchase a smartphone or tablet. There are no TV sets in the home. At times, the screen is set up at the panchayat office where movies are screened.
	Parent 1	We do not have money to purchase smartphones. If any day we could arrange money, we would first purchase a new machine for our farm than a smart device.
	NGO Head	Some of the students are really excited to learn digitally and hence help in collecting funds from the villagers so that we can purchase additional computers.
	Anganwadi head	Students in our village do not have a smartphone. There might be a single phone in a house that is wired (Telephone) and is being used by all the members of the family.

Table 6 Infrastructure Issues as noted in Interview (Digital Devices)

Infrastructure	Participants	Responses
Internet	Teacher 1	There are no Wi-Fi providers in our areas. The maximum internet I can access is on my phone and speed is extremely limited (2G)

	Teacher 2	Wi-Fi does not exist in our village. I just have a basic Internet plan in my phone which is very costly.
	Parent 1	We do not know anything about the Internet.
	NGO Head	Some of the areas have Wi-Fi connection which are nearer to the town but mostly here, there is extremely limited connectivity. We use hotspots to connect computers to the internet from our phones.
	Anganwadi head	There are no Wi-Fi or internet providers in our areas. Even I have to go on the outskirts to get networks on my phone.

Table 7 Infrastructure Issues as noted in Interview (Internet)

Infrastructure challenges play a significant role in hindering the effective implementation of the Digital India Programme in rural areas. These challenges limited access to digital technologies and connectivity, impacting the success and reach of digital education initiatives. Based on the themes and responses received, following infrastructure related challenges were found, which are listed below –

1. **Limited Internet Connectivity:** Rural areas often face inadequate or unreliable internet connectivity, resulting in slow or intermittent internet access. This hampers the seamless delivery of online educational content, communication, and access to digital resources.
2. **Inadequate Electric Power Supply:** Many rural areas experience inconsistent or limited electricity supply, making it challenging to power digital devices and sustain their usage. Insufficient power infrastructure has hampered the effective implementation of digital education programs.

3. **Lack of Digital Infrastructure:** Rural areas lack the necessary digital infrastructure, such as computer labs, high-speed internet connections, and digital learning resources. This scarcity of infrastructure limits the availability and accessibility of digital education tools and resources for both teachers and students.
4. **Insufficient Hardware:** The availability and affordability of digital devices pose a significant challenge in rural areas. Students and schools have limited access to computers, laptops, tablets, or smartphones, which are essential for effective participation in digital education activities.
5. **Infrastructure Maintenance:** Sustaining and maintaining digital infrastructure in remote and rural areas can be a challenge. Lack of technical support, limited funds for repairs, and inadequate training for maintenance staff can lead to infrastructure deterioration and hinder the long-term effectiveness of digital education initiatives.
6. **Connectivity Disparities:** Even within rural areas, there can be disparities in connectivity, with some regions having better access to internet services compared to others. This inequality further exacerbates the digital divide and hampers equal access to digital education opportunities.
7. **Challenges with Last-Mile Connectivity:** The last-mile connectivity refers to the challenge of extending internet connectivity from major infrastructure points to individual households or institutions. The remoteness and scattered nature of rural communities make it challenging to establish and maintain last-mile connectivity.
8. **Bandwidth Limitations:** In rural areas with limited internet infrastructure, bandwidth constraints can impact the speed and quality of internet connections. This can result in slower data transfer rates and difficulties in accessing online educational content.

4.2.2. Knowledge and Government support in Digital India Programme

When asked about understanding of Digital India programme and how government has supported it their villages various responses were received. The these generated from these interviews along with the context of information gathered is listed below –

Area	Participants	Responses
Knowledge of the Programme	Teacher 1	I have a basic understanding of computer systems. I have heard about the programme but did not study it in detail.
	Teacher 2	There was some you tube video I saw about the programme. I know how to use the systems but have not tried it yet.
	Parent 1	We do not know about the Digital India programme.
	NGO Head	There was content about online education which I downloaded and stored on my local laptop. I have planned to show it to the students in the future once our lab is up and running.
	Anganwadi head	I have heard about this but did not know how it is implemented.

Table 8 Knowledge about the programme as noted in Interview

Area	Participants	Responses
Government Support	Teacher 1	The government has not yet set up any policy for this in our village. The panchayat office might have some information in this regard.
	Teacher 2	I have read that government has launched various schemes under this programme including some TV channels that

		provide knowledge to students, but since there is no access to TV or devices, I am not sure how it will be implemented.
	Parent 1	We do not know about any government support in this regard.
	NGO Head	We are primarily funded by crowdfunds. The government has registered our NGO but has not committed to any funds in this regard.
	Anganwadi head	I do not know about any government support in this regard.

Table 9 Government Support about the programme as noted in Interview

Area	**Participants**	**Responses**
Implementation of the Programme	Teacher 1	Definitely, if we have electricity and proper access to devices and the internet, we can collectively learn and instruct students using online mediums.
	Teacher 2	I would be really happy to implement this in our school as this will help students understand the concepts in greater detail.
	Parent 1	We will be happy if our kid is learning through new mediums and if he/she becomes equivalent to students in town.
	NGO Head	This can be easily implemented in our village if we have proper access to infrastructure.
	Anganwadi head	I will be more than happy to instruct students with new interactive mediums as this will excite the students more and encourage them to come to school regularly.

Table 10 Implementation of the program as per Interview

Area	Participants	Responses
Benefits of the Programme according to you	Teacher 1	- Increase access to education - Enhance teaching patterns - Skill Development
	Teacher 2	- Encourage students to study using new methods - Enhance skills - Enrich the learning experience - Provide them easy access to study
	Parent 1	- Promote education - Enhance skill - Help my kid to study from home and work simultaneously
	NGO Head	- Enhance the learning experience - Easy understanding of difficult concepts - Promote innovation
	Anganwadi head	- Encourage them to come to school - Development of Skill - Provide an easy explanation of problems

Table 11 Benefits of the programme as noted in the Interview

Challenges related to awareness of the Digital India Programme and government support can impact its effective implementation in rural areas. These challenges can limit the participation and engagement of stakeholders and hinder the successful adoption and utilization of digital education initiatives. Based on the themes and responses received, the following awareness and government support challenges were found, which are listed below -

1. **Limited Awareness:** One of the primary challenges is the lack of awareness about the Digital India Programme among stakeholders, including teachers, students, parents, and community members in rural areas. Insufficient knowledge about the program's objectives, components, and benefits can impede their active involvement and hinder the program's effectiveness.
2. **Limited Knowledge of Program among Teachers:** Teachers have limited knowledge about the specific objectives and goals of the Digital India Programme. This lack of awareness can prevent them from aligning their teaching practices with the program's intended outcomes and hinder the successful integration of digital technologies in the classroom.
3. **Challenges in Implementing Digital Tools:** Lack of awareness about digital tools and resources provided through the Digital India Programme have made it difficult for teachers to effectively implement them in their teaching practices. They are not aware of the available educational apps, online platforms, or content repositories that can support their instruction.
4. **Limited Digital Literacy:** Teachers have limited digital literacy skills, which has hindered their ability to effectively use digital technologies in their teaching. This lack of awareness and proficiency in using digital tools has prevented them from fully capitalizing on the opportunities provided by the Digital India Programme.
5. **Insufficient Training and Professional Development:** Teachers have not received adequate training or professional development opportunities related to the Digital India Programme. This has contributed to their lack of awareness and confidence in utilizing digital technologies in their classrooms.
6. **Limited Government Support at the Grassroots Level:** The implementation of the Digital India Programme requires adequate support and coordination at the grassroots level. Insufficient government support, including training programs, capacity-building

initiatives, or local facilitation, has impeded effective implementation and hindered stakeholder engagement in rural areas.

7. **Resource Allocation:** Limited resources and funding were allocated for awareness campaigns, training programs, and community engagement initiatives which have restricted the scope and effectiveness of government-supported activities. Insufficient resources have hindered the government's ability to create awareness and promote the Digital India Programme at the grassroots level.

While conducting the interviews it was also asked that what are the perceived benefits of the programme as per the participant and following benefits were noted down –

1. **Increased Access to Education:** Digital platforms and online learning materials will enable students in underserved regions to access educational content, regardless of their location.
2. **Enriched Learning Experiences:** The Digital India Programme will integrate digital tools and resources into teaching and learning processes, enhancing the overall learning experiences of students. Interactive multimedia content, simulations, and virtual reality-based applications will make learning more engaging, interactive, and personalized.
3. **Enhanced Teaching Effectiveness:** Digital technologies will empower teachers with innovative tools, teaching aids, and online resources to support their instructional practices. Teachers will be able to utilize digital platforms for lesson planning, content delivery, and student assessments, which will enhance their effectiveness in catering to diverse learning needs.
4. **Promoting Digital Literacy:** The program will equip the students with the skills required to navigate digital platforms, critically evaluate information, use productivity tools, and engage responsibly and safely in the digital space.

5. **Bridge the Digital Divide:** By providing resources and infrastructure in rural and underserved areas, the program will help reduce disparities in access to educational opportunities.
6. **Skill Development for the Future:** The Digital India Programme will equip the students with essential digital literacy, problem-solving, collaboration, and critical thinking skills that will increase value in the workforce.

4.2.3. COVID'19 Impacts on Education

When asked about how education happened during COVID'19 and how it has impacted child's mindset various responses were received. The these generated from these interviews along with the context of information gathered is listed below –

Impacts of COVID'19	Participants	Responses
Teaching during COVID'19	Teacher 1	During COVID'19 limited teaching happened in our school. Students were called in intervals of one or two weeks just to submit their homework. There were no exams held during this time.
	Teacher 2	Teaching during COVID was particularly challenging. Parents were not ready to send their students to schools even after the first wave settled down. It was exceedingly difficult to bring back students to school. There were many dropouts happened during that time.
	Parent 1	My kid was not studying at all during COVID. All he did was play the entire day. He lost complete interest in his studies.

	NGO Head	The students were given an assignment and they have to produce a solution every three days. The students were called in rotation every day (1 bunch on 1 day and 2nd on the other and likewise). But the students were not able to solve their homework most of the time.
	Anganwadi head	A group of students was called on each day and the next group on the other day. 6 days of school became 3 days in this way. But we continued to provide classes.

Table 12 Teaching During COVID as noted during Interview

Impacts of COVID'19	**Participants**	**Responses**
Student Mindset Changes	Teacher 1	There was a loss of education for almost 2 years. Kids lost interest in their studies. Most of them were not even ready to come to school.
	Teacher 2	The students were only coming to the school for Mid-day meals and had no interest in studies. They forgot whatever was taught earlier and I had to start from the beginning to bring them back.
	Parent 1	My kid just does not want to go to school anymore. He enjoys farming activities and helps me to do regular work.
	NGO Head	The students tried to cover up their syllabus, but it took double the time from what it was taking previously.
	Anganwadi head	Definitely, the students were hesitant to come to school. Even the parents were not reluctant to send their kids to school. It took a lot of time to convince them to bring them back.

Table 13 Student Mindset Changes towards Digital India programme as noted in Interview

From the responses, it was well understood that no online medium was used to promote Digital education in rural India. It is evident that no or limited learning happened during COVID'19. Though some of the alternative teaching methods were adopted by teachers and schools including rotational study plans and home assignments etc. there was no mention of the usage of digital tools to provide education. This was due to a lack of Digital infrastructure in villages and unawareness of the program among teachers and students. When asked about how COVID'19 impacted a child's mindset various responses were received. Based on the themes and responses received, the following COVID'19-related challenges were found, which are listed below –

1. The sudden closure of schools and the shift to remote learning disrupted the normal academic routine of students. The uncertainty and prolonged absence from the classroom led to a sense of disengagement and reduced motivation to go to school among students in rural areas.
2. In some cases, students in rural areas had to take on additional responsibilities during the pandemic. They got involved in household chores, caring for siblings or family members, or engaging in income-generating activities. These responsibilities impacted their ability to focus on their studies and their overall mindset toward education.
3. The pandemic prompted some students in rural areas to reassess their priorities and aspirations. Economic hardships and disruptions in education led to a shift in focus towards immediate needs and concerns, potentially impacting their mindset toward long-term educational goals.

4.2.4. Interview with online education provider

A quick call was done with the owner of one of the online education providers in urban India. Various questions were asked in the interview as stated in Appendix X to understand their views on how digital education can be make effective in rural India.

The response received is described below –

Themes	Refined Responses
Challenges to Digital Education as an online education provider	The lack of sufficient digital infrastructure, including reliable internet connectivity and access to electricity, poses significant challenges in rural areas. Inadequate network coverage and slow internet speeds hinder seamless access to online educational resources. Students in rural India may also lack familiarity with digital tools and platforms, making it difficult to effectively utilize and engage with online learning environments. Furthermore, financial constraints and the high cost of digital devices, internet connectivity, and data plans create barriers to accessing digital education in rural areas.
Plans for expanding to rural India	There are plans for expansion into rural India, provided that key challenges such as access to electricity, internet connectivity, and digital devices are addressed. The online education providers are prepared to provide digital devices, but the setup of infrastructure is necessary for successful implementation.
Queries from Rural India	The online education providers receive queries from educated and affluent families in rural areas. Additionally, there are users in remote parts of India who also utilize their services. The providers have not restricted people in rural India from accessing their services; it is primarily a matter of readiness and infrastructure setup.

Setting up Physical education center as in urban areas	There is a vision to establish physical education centers in rural areas, but this can only be possible once constraints such as electricity, internet availability, and the readiness of required teachers are addressed.
Collaboration with NGO's/ Government Agencies	The online education provider has collaborated with numerous multinational corporations (MNCs) that plan to provide digital assets and subscription plans to students as part of their Corporate Social Responsibility (CSR) activities. However, currently, the government has not outlined any specific plans for collaboration with the providers.

Table 14 Themes Generated from Interviews

4.3. Observations from the physical site visits

Out of the 29 places in India from which data is collected, the researcher visited 12 of them and observed some key items that were common to each location and are listed below –

1. Schools in remote areas faces major infrastructure challenges such as inadequate classroom space, lack of basic amenities like clean water and sanitation facilities, and poorly equipped classrooms with limited furniture and resources. The lack of proper infrastructure impacted the learning environment and hindered effective teaching.
2. Almost all schools visited in these remote areas had limited access to technology and digital resources. The availability of computers, laptops, or tablets was limited to just one or two schools, and internet connectivity was nonexistent. This restricted the integration of digital technologies into teaching and learning processes.
3. Schools in remote areas had a shortage of qualified and trained teachers. Due to the remote location and limited facilities, attracting and retaining skilled teachers was

challenging. This led to larger teacher-student ratios and reduced individual attention for students.

4. In remote areas, multi-grade classrooms were quite common, where students from different grade levels were taught together. This arrangement was necessitated because of the limited number of teachers and classrooms available. Managing multi-grade classrooms requires differentiated instruction and flexible teaching approaches to meet the diverse needs of students which was not present there.
5. Schools in remote areas were located far away from students' homes, and the lack of proper transportation infrastructure made it challenging for students to commute to school regularly. The long distances and difficult terrain resulted in increased absenteeism and dropout rates.
6. Most of the states visited had a distinct set of languages used in schools. This creates a hindrance if the books or the data is not available in the native language.
7. There were lot of socio- economic challenges also noted in these remote areas. Students faced poverty, limited access to healthcare, and other challenges that impact their ability to focus on education. Schools in these areas should provide additional support and interventions to address these socioeconomic challenges.
8. Schools in remote areas had limited access to educational resources, including textbooks, teaching aids, and libraries. This impacts the quality of education and the ability of teachers to deliver engaging lessons.

It was understood that despite these challenges, students and teachers in remote areas demonstrated remarkable resilience, determination, and an ardent desire for education. They made the most of the available resources and opportunities to pursue learning and overcome obstacles.

Overcoming the challenges faced in remote areas of India requires a multi-faceted approach involving various stakeholders and addressing various aspects of the educational ecosystem. Some of the strategies recommended to overcome these challenges include -

1. Government bodies and educational authorities should prioritize infrastructure development in remote areas. This includes constructing and renovating school buildings, providing basic amenities like clean water and sanitation facilities, and ensuring access to reliable electricity. Adequate classroom space and well-equipped classrooms with necessary resources should be made available.
2. Efforts should be made to improve access to technology and digital connectivity in remote areas. This can include setting up computer labs, providing laptops or tablets to students, and establishing reliable internet connectivity. Collaborations with telecom providers and government initiatives to extend network coverage can help bridge the digital divide.
3. Steps should be taken to attract and retain qualified and trained teachers in remote areas. This can involve providing incentives, professional development opportunities, and support systems for teachers. Recruitment drives specifically targeting remote areas and initiatives to build local teaching talent can be beneficial.
4. Teachers should be provided with training and resources to effectively manage multi-grade classrooms. Strategies like differentiated instruction, cooperative learning, and peer tutoring can be employed to meet the diverse learning needs of students across different grade levels.
5. Schools in remote areas should actively engage with local communities and foster partnerships. Involving parents and community members in school activities, decision-making processes, and resource sharing can enhance the overall educational experience. Community participation can lead to increased support, volunteerism, and a sense of ownership in the school.
6. Schools should provide additional support systems to address socioeconomic challenges faced by students. This can include providing scholarships or financial aid, offering mid-day meals, healthcare services, and counseling support. Collaboration

with local NGOs, government welfare schemes, and community organizations can help in addressing these challenges effectively.

7. Collaboration with non-profit organizations, corporate entities, and government agencies can help mobilize additional resources for schools in remote areas. This can include donations of books, equipment, scholarships, and infrastructure development initiatives.

4.4. Quantitative Research –

As the research is about the exploratory study of the effectiveness of the Digital India program in Rural India post-COVID, a quantitative study was used to further determine if the students have any knowledge about such programme, awareness about the digital tool, and willingness to use modern technology for technology. The quantitative data were analyzed from the responses obtained from Four Hundred Eighty-Seven (487) respondents, and the main results are shown in the form of graphs followed by a descriptive explanation of the data on it.

4.4.1. General Demographics Information

This section presents a descriptive analysis of the sample, which provides an outline of the respondents' characteristics, such as age, gender, location including village and state, family demographics, type of schools, grade in which student is studying, distance from home to school and mode of communication from home to school.

4.4.1.1. Age Range of Participants

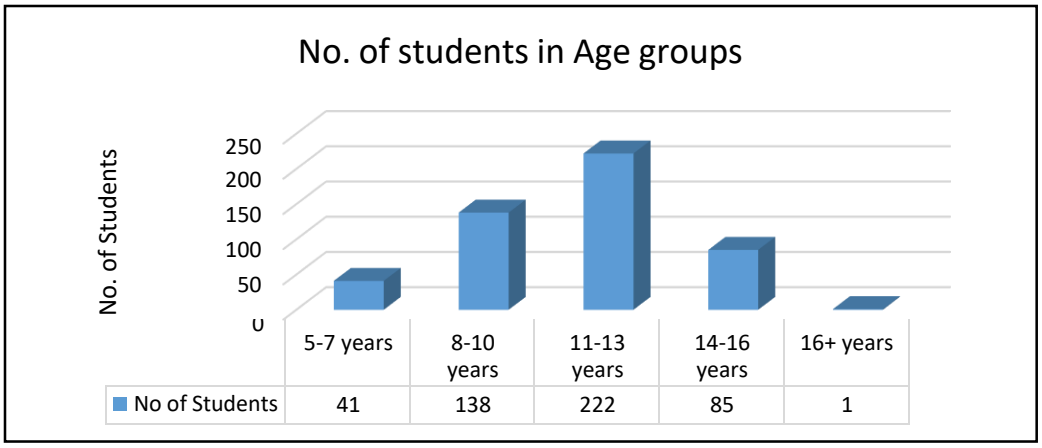

Figure 3 Age of the students in surveys conducted

From the analysis, it had been found that 41 of the students belong to the 5 to 7 years age range, 138 students belong to the 8 to 10 years age range, 222 students belong to the 11 to 13 years age range, 85 students belong to 14 to 16 years age range, and 1 belong to 16+ age range, respectively. Figure 3 represents the frequency distribution of age and discloses that the sample was more towards the age group of 11 to 13 years range that accounted for 46% of the participants.

4.4.1.2.Gender Division of Participants

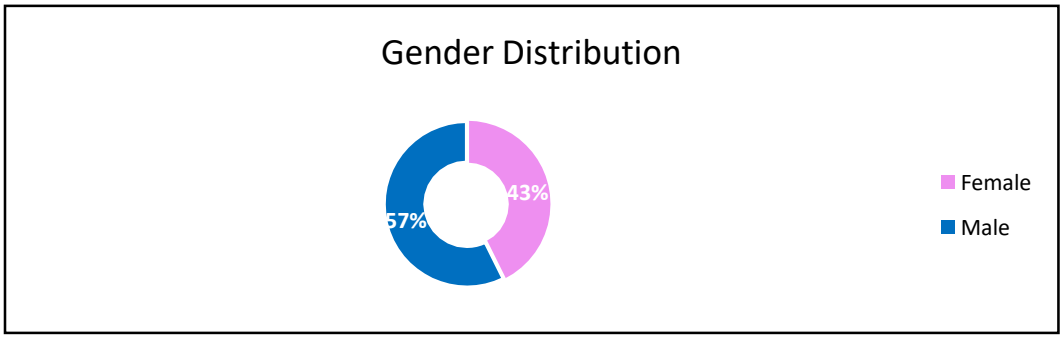

Figure 4 Gender Distribution of students in surveys conducted

The above figure presents the gender distribution which gives a picture of the student composition of rural India, that the majority of the students are males (279 responses). (Statista, 2021)The Statista report produced in 2021 supports this and states that in 2021, females only represent only 43% of the total students.

Gender disparities in the education sector in rural India have been a persistent challenge, although progress has been made in recent years. Some of the key aspects highlighting gender disparity in education in rural India are listed below –

1. Despite efforts to improve gender parity, girls in rural areas still face lower enrollment rates compared to boys. Factors such as cultural norms, early marriages, and limited economic opportunities for girls contribute to their lower access to education. Additionally, girls often experience higher dropout rates due to household responsibilities, societal pressures, and a lack of safety measures during their commute to school.
2. Deep-rooted social norms and expectations influence the educational choices and opportunities available to girls in rural areas. Traditional gender roles often prioritize domestic responsibilities over education for girls, reinforcing gender disparities in educational access and outcomes.
3. Safety concerns can function as a barrier to girls' education in rural areas. Long distances to schools, lack of safe transportation, and inadequate safety measures in school’s hinder girls' access to education. Safety concerns, including gender-based violence and harassment, also contribute to higher dropout rates among girls.
4. Girls in rural areas often have limited opportunities for higher education and skill development. Higher education institutions are often located in urban areas, which could be inaccessible or unaffordable for girls from rural backgrounds. This limits their ability to pursue higher studies and acquire the necessary skills for employment.

To curb gender disparities in the education sector in rural India, it is essential to implement a comprehensive set of strategies and interventions including enhancing access to education, promoting enrollment and retention, gender-sensitive curriculum and teaching practices, teacher training and capacity building, empowering girls and building life skills, community engagement and awareness, and Women's Empowerment and Representation.

1.4.1.3. Count of Family Members

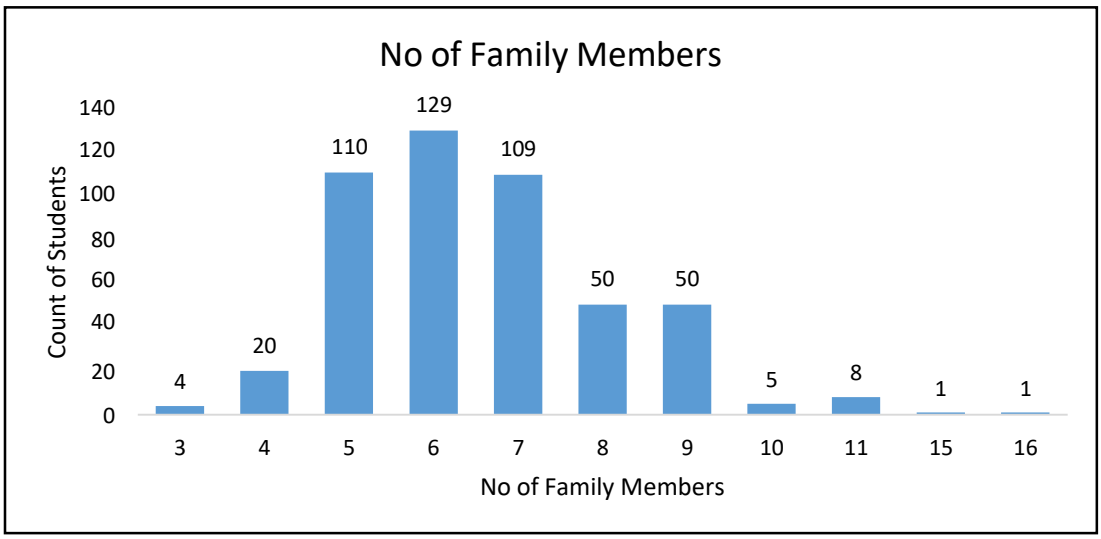

Figure 5 No of Family members in each student household in surveys conducted

Type of Family	Count of Students
Small Families (3-5)	134
Large Families (6+)	353

Table 15 Types of Families in Rural India

The majority of the families in rural India are large families (353 families) which is around 72%. Big Families are classified as families with members six and greater than six. Due to nature of families in rural India, there are various challenges that come across –

1. Large families usually face a significant economic burden as the financial resources are limited, and the household income may be insufficient to meet the needs of all family members. This leads to financial stress, poverty, and difficulty in providing basic necessities such as food, clothing, healthcare, and education.
2. Large families usually struggle to provide adequate educational opportunities for all their children. Limited financial resources, coupled with the cost of education-related expenses such as school fees, books, and uniforms, can hinder access to quality education for all family members.
3. Large families often face challenges in providing adequate housing and living space for all family members. Limited space sometimes leads to overcrowding, lack of privacy, and compromised living conditions, which can impact the physical and mental well-being of family members.
4. Large families often face difficulties in accessing quality healthcare services and ensuring proper nutrition for all family members. Limited financial resources, lack of healthcare facilities in rural areas, and inadequate knowledge about healthcare practices contribute to health disparities within the family.
5. Large families often need to divide limited resources and responsibilities among family members. This leads to unequal distribution of resources, unequal burden of household chores, and limited individual attention and support for each family member.
6. Large families face challenges in accessing education and employment opportunities for their members. Limited access to educational resources and the need for additional income generation results in children dropping out of school at an early age and individuals being engaged in low-wage, informal labor.
7. Large families experience interpersonal conflicts and challenges in maintaining harmonious relationships. Differences in opinions, conflicting interests, and competition for resources strain relationships within the family and lead to stress and emotional turmoil.

These challenges can be curbed by –

1. Improving access to education, healthcare, and social welfare programs
2. Providing financial support and incentives for education and skill development
3. Promoting family planning and reproductive health services
4. Creating awareness about gender equality and women's empowerment
5. Enhancing employment opportunities and livelihood support
6. Strengthening social support systems and community networks
7. Implementing effective social welfare policies and poverty alleviation programs

1.4.1.4. States and UT from which data is collected

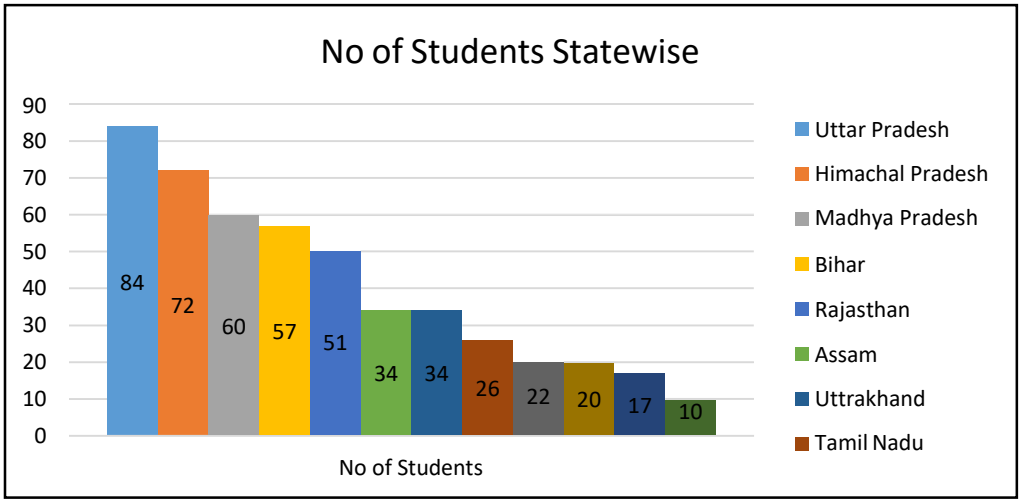

Figure 6 No of Students in each stage in surveys conducted

The data is collected from 12 states. The majority of the data is collected in Uttar Pradesh (84 responses) which accounted for 17%. The least number of responses were collected from Punjab (10 responses) which is around 2%.

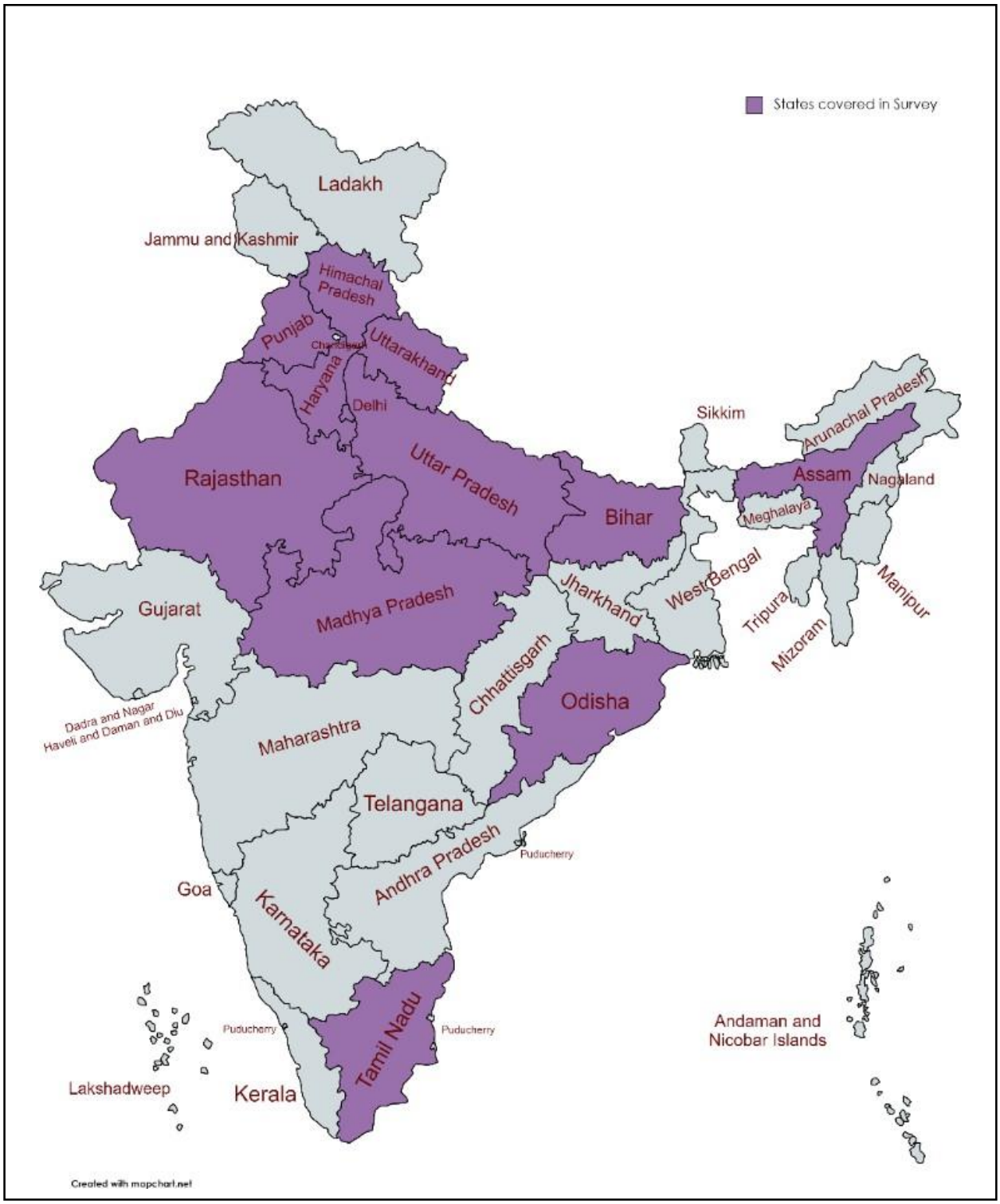

Figure 7 States where survey is conducted

The map represents the states and UT in India from which data is collected. The researcher has tried to cover all the regions in the country to make the study effective and get a holistic view of the data in research. Distribution of states includes –

Region	State
North	Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, and Uttar Pradesh
South	Tamil Nadu
East	Bihar, Assam, Odisha
West	Rajasthan, Madhya Pradesh

Table 16 States from which Data is collected

Collecting data from all four regions in India, namely North, South, East, and West, was crucial for obtaining a comprehensive understanding. Below are the reasons why the data collection from all four regions made it effective -

1. India is a diverse country with significant regional variations in terms of culture, language, socio-economic conditions, and educational systems. Collecting data from all four regions ensures that the diversity and unique characteristics of each region are represented, providing a more holistic and accurate picture of the overall situation.
2. Different regions in India experience varying levels of development, infrastructure, and access to resources. By collecting data from all regions, it becomes possible to identify regional disparities and inequalities in educational outcomes, access to opportunities, and challenges faced. This information is crucial for policymakers and stakeholders to design targeted interventions and policies to address regional disparities.
3. Each region in India has its own specific context, including geographical, cultural, and socio-economic factors that influence educational practices and outcomes. Data coverage from all regions helps in gaining a deeper understanding of region-specific challenges, strengths, and

needs. This understanding is essential for developing contextually relevant strategies and initiatives.

4. Collecting data from all regions allows for comparative analysis between different regions. This analysis helps identify best practices, successful models, and innovative approaches that can be replicated or adapted to improve educational outcomes in other regions. It facilitates the exchange of knowledge and experiences, leading to the sharing of effective strategies and lessons learned.

4.4.1.5. Distribution of Students according to Grades

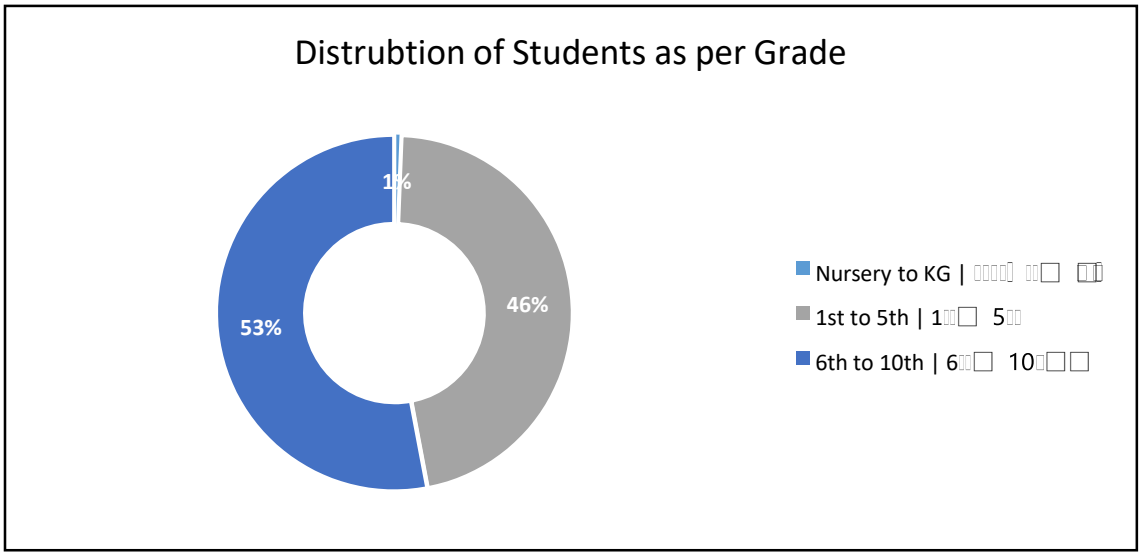

Figure 8 Distribution of Students as per grade in school

From the data collected, 53% of the students studying were in the 6th to 10th grade of their education, 46% were in 1st to 5th grade, and just 1% were starting were their primary education.

Age	1st to 5th	6th to 10th	Nursery to KG	Total
5			1	**1**
6	1		2	**3**
7	37			**37**
8	49			**49**
9	60			**60**
10	29			**29**
11	15	43		**58**
12	18	63		**81**
13	7	76		**83**
14	10	55		**65**
15		17		**17**
16		3		**3**
17		1		**1**
	226	**258**	**3**	**487**

Table 17 Age and Grade of the students in the Surveys

The age of students and the standard in which they were studying represented the right age group for studying in that grade except for a few cases. This includes students in the age group of 16-17 and still studying in grades 6^{th} to 10^{th} (1% of the sample size) and similarly students in the age group of 12-14 and studying in grades 1^{st} to 5^{th} (7%). Some of the reasons for this were –

1. **Poor economic condition:** Students have to miss school due to family issues and have to skip a few years of schooling.
2. **Poor Academic performance:** Some of the students were not able to comprehend what was taught in class and could not qualify for the examination. Hence, they had to repeat that class.

3. **COVID'19:** Some of the students had lost touch with education and started to work on farms during COVID'19. Also, students were not reluctant return back to school on time.

4.4.1.6. Types of Schools

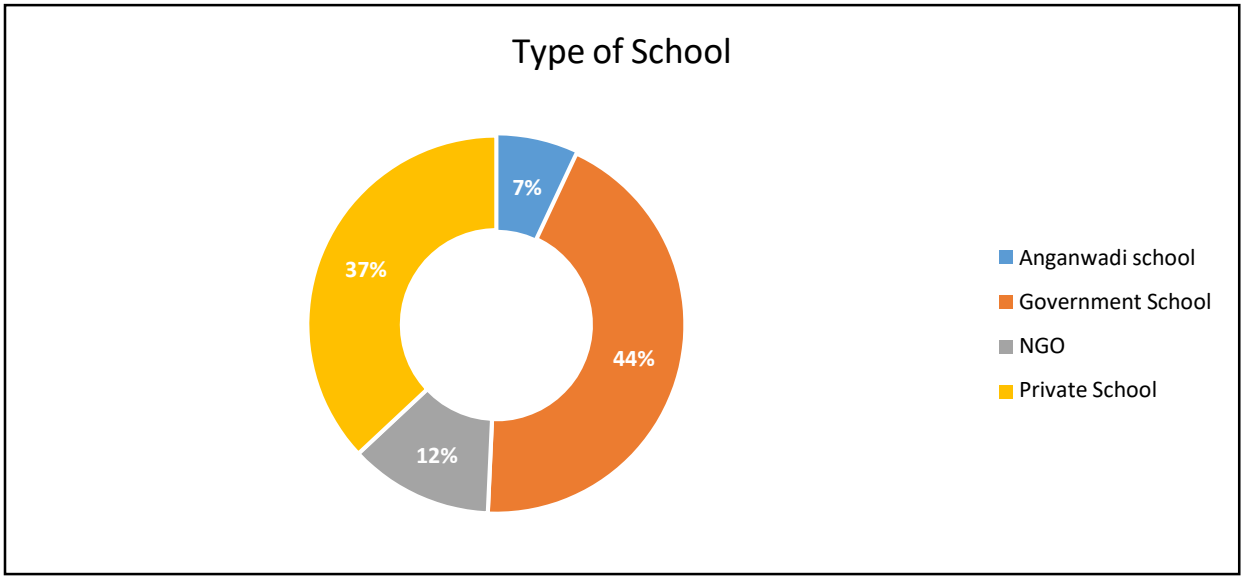

Figure 9 Types of schools of students participated in surveys conducted

The responses were collected from 4 types of schooling present in Rural India. Maximum responses came from Government schools (44%) followed by Private schools (37%). The least number of responses came from NGO (17%) and Anganwadi (7%).

Government schools are run and funded by the government, and they play a significant role in providing education in rural areas. These schools cater to a large number of students and provide education at subsidized or no cost. However, government schools in rural areas face challenges such as inadequate infrastructure, lack of resources, and a shortage of trained teachers, which can impact the quality of education.

Private schools are operated by individuals, organizations, or non-governmental entities. They charge fees and offer a range of educational approaches and curricula. Private schools in rural

areas vary in terms of infrastructure, resources, and quality of education. Some private schools provide better facilities and resources compared to government schools, but affordability is a barrier for many rural families.

NGOs are non-profit organizations that work independently or in collaboration with government agencies to address social issues and provide assorted services. In the education sector, NGOs in rural India undertake initiatives such as setting up schools, providing educational resources, teacher training, promoting literacy programs, and implementing community-based educational projects.

Anganwadi are government-operated integrated child development centers in India. They provide a range of services, including early childhood education, nutrition, healthcare, and preschool education, primarily targeting children up to six years of age and expectant mothers. Both NGOs and Anganwadi contribute significantly to improving education in rural India. Their initiatives, interventions, and support play a vital role in enhancing access, quality, and inclusiveness of education for children in rural areas, thereby laying a solid foundation for their overall development. Collaboration between NGOs, Anganwadi, and government bodies strengthens the impact and helps address the unique educational needs and challenges in rural India.

4.4.1.7. Distance of School from Home

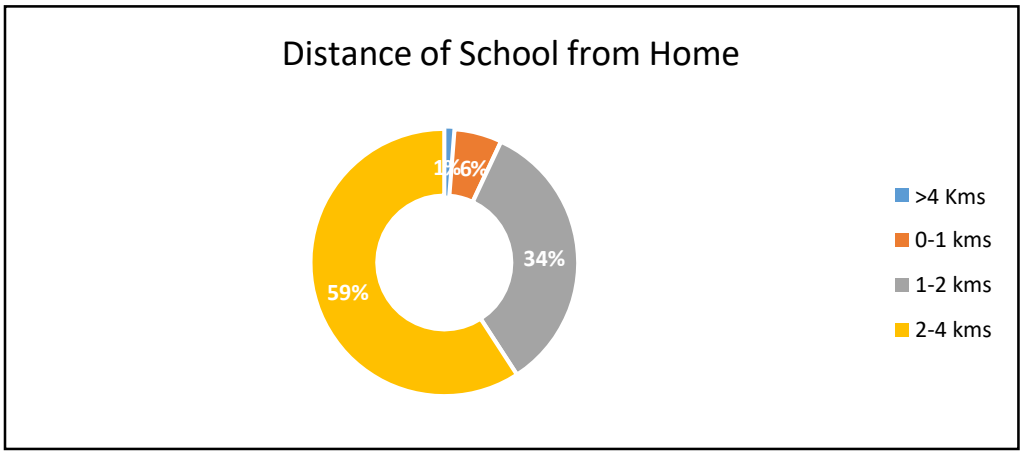

Figure 10 Distance of School from Home of student

From the data collected it was observed that 59% of the students have houses located at a distance of 2-4 km and 34% have houses located at a distance of 1-2 km. 1% of the students also had houses located far away at a distance of greater than 4 km. There are various challenges especially in rural India due to distance of schools from home –

The distance between a student's home and school affects their access to education. Since the school is located far away and transportation options are limited, it becomes challenging for students to regularly attend school. This results in decreased enrollment rates, absenteeism, and lower overall educational participation.

Long travel distances to school consume considerable time and energy for students, particularly in rural areas and especially in northern India with inadequate transportation infrastructure. Lengthy commutes lead to fatigue and limit students' ability to engage fully in classroom activities and complete assignments. It also impacts their motivation and concentration levels.

Distance also impacts the safety of students traveling to and from school, especially in remote or poorly connected areas. Unsafe routes, lack of transportation options, or travel through isolated areas pose risks, particularly for girls and students from marginalized communities. Safety concerns discourage parents from sending their children to school.

Distance also affects parental support and involvement in their child's education. Parents face challenges in actively participating in school-related activities, attending parent-teacher meetings, or providing academic support due to the logistical difficulties associated with long travel distances.

Students who have to travel long distances also have limited time for extracurricular activities, accessing educational resources outside of school, or participating in community learning opportunities. This impacts their overall exposure to educational experiences and hinders holistic development.

Distance from home to school also influences the availability of educational opportunities. In remote rural areas, schools have limited resources, fewer subject options, and a lack of specialized teachers, resulting in limited educational opportunities for students.

Efforts to mitigate the impacts of distance on education include improving transportation infrastructure, establishing schools in close proximity to communities, providing hostel facilities for students who live far away, implementing distance learning programs, and using digital education. By reducing the barriers imposed by distance, such interventions can enhance educational access, reduce dropout rates, and promote better educational outcomes for students in rural areas.

4.4.1.8. Mode of Commutation

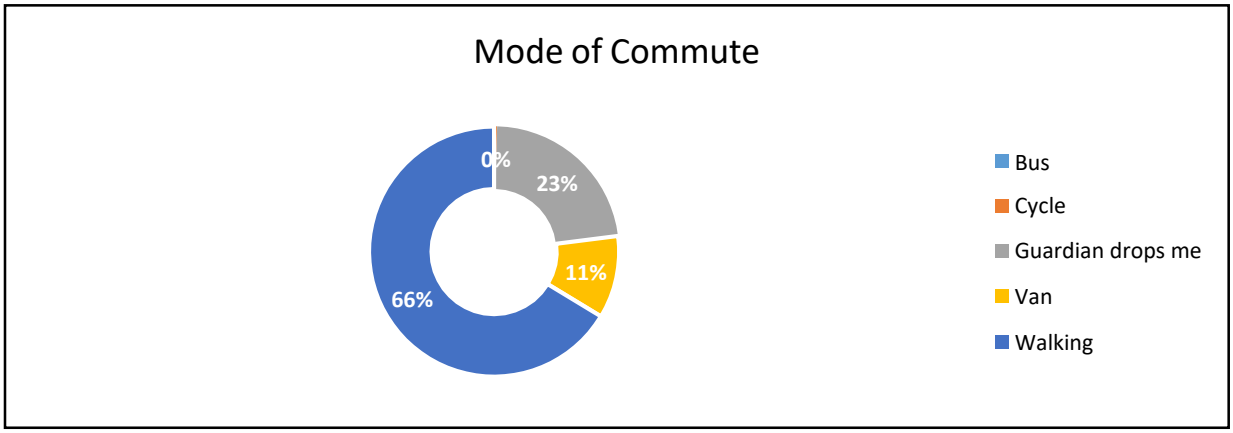

Figure 11 Mode to commute to school

Almost 66% of students travel to school by walking, followed by a family member dropping them to school (23%). Only 12% of the students use either the public transport or Van to come to school.

Distance/ Mode to Commute	Bus	Cycle	Guardian drops me	Van	Walking	
>4 Km				2	4	6
0-1 km				2	26	28
1-2 km			62	5	98	165
2-4 km	1	1	48	43	195	288
	1	**1**	**110**	**52**	**323**	**487**

Table 18 Mode of Commutation and Distance from the school to home

Almost 199 students (40%) of the students travel to school by walking. This has been a challenge as the distance is huge in some cases 3-4 km or more. The student has to travel for almost an hour back and forth to attend schooling. We have already seen challenges pertaining to distance in the section above. Necessary actions should be taken to curb this issue.

4.4.2. Availability of Resources and Internet Access

It is important to analyze the availability of resources and internet access in the context of rural and digital education. In this section, the research is trying to assess the presence and quality of physical infrastructure necessary for education, such as schools, classrooms, libraries, laboratories, and educational materials. Also, he is trying to analyze the adequacy of these resources in rural areas and identify any gaps or deficiencies. Along with this, the researcher is trying to examine the availability and quality of technology infrastructure, including electricity supply, computer labs, internet connectivity, and access to devices such as computers, laptops, tablets, or smartphones. It is also especially important to analyze the availability, reliability, and speed of internet connectivity in rural areas. In this section, the researcher also considers the types of internet connections available (if any) such as broadband, Wi-Fi, or mobile data, and assesses their accessibility to students, teachers, and educational institutions.

Some of the key questions designed in the questionnaire include the availability of electricity and its duration, types of devices available, access to the internet, mode of connectivity, usage of smartphones, availability of digital infrastructure in schools, knowledge about the digital India program, and willingness of students to study using these mediums.

4.4.2.1. Availability of Electricity in Rural India

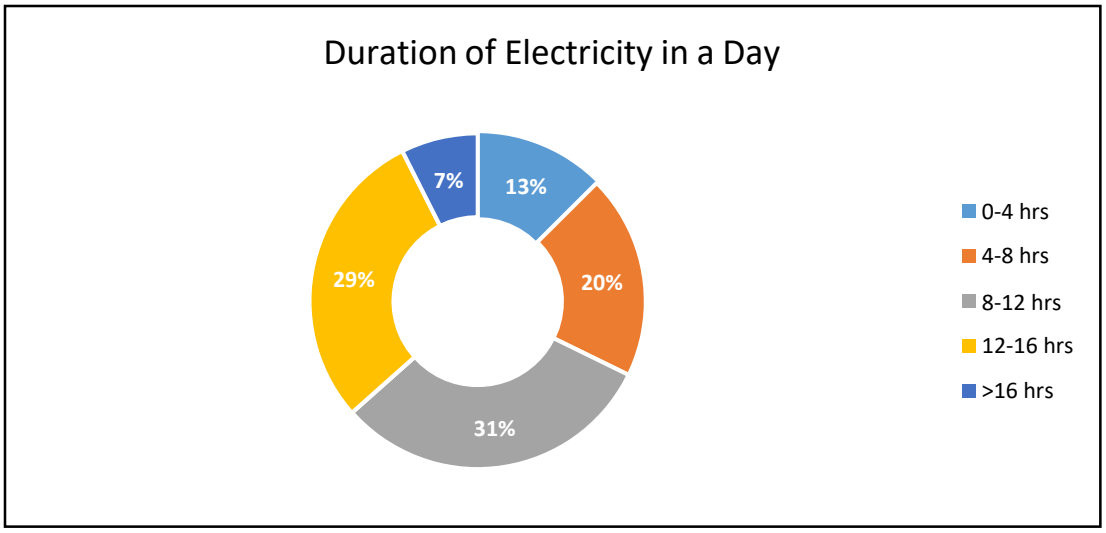

Figure 12 Duration of Electricity in a Day

From the responses received it was evident that almost at 31% of the place's electricity was available for 8-12 hours and at 29% of the places it is available for 12-16 hours. However, for 40% of the places, electricity is available for less than 8 hours.

To understand more regional analysis of the data is done –

Hours	Average hours of electricity	East	North	South	West	Total
>16 hrs	20		22	6	8	36
0-4 hrs	2	60	1			61
12-16 hrs	14	4	82	13	43	142
4-8 hrs	6	27	46		23	96
8-12 hrs	10	17	91	7	37	152
Total Participants		**108**	**242**	**26**	**111**	**487**

Table 19 Availability of Electricity as per region in India

Weighted Mean	East	North	South	West	Mean Hours
Sum of Weighted terms	508	2776	372	1270	
Total no of terms	108	242	26	111	
Weighted Mean	**5**	**11**	**14**	**11**	**10**

Table 20 Weighted Mean of Availability of Electricity

Using weighted mean method of statistics, it was found that rural places in south India has more availability of electricity (14 hours on average) and villages in east India have electricity for only 5 hours a day. Considering rural India as a whole, electricity is available for only 10 hours in a day and the hours of electricity availability are not defined. Due to lack of electricity, there are various challenges that hinders the success of the programme –

1. Inadequate or unreliable electricity supply limits access to digital resources and technology-dependent educational tools. This hampers the ability of students and teachers to utilize online learning platforms, digital libraries, educational software, and interactive multimedia resources, thus affecting the quality and effectiveness of education.
2. Frequent power outages or irregular electricity supply disrupt teaching and learning processes in classrooms. It results in interrupted lessons, loss of instructional time, and the need for teachers to modify their teaching plans accordingly. This can impact the continuity and progression of the curriculum.
3. Insufficient electricity availability discourages the integration of technology into teaching practices. Teachers have to rely more on traditional, non-electronic methods of instruction due to the uncertainty of having access to electricity during lessons. This limits opportunities for interactive and engaging teaching approaches that leverage technology.

4. Electricity challenges hinder the use of audiovisual aids such as projectors, smart boards, and multimedia presentations in classrooms. These aids are valuable for visual and auditory learning experiences, enhancing students' understanding and retention of concepts. Their limited use affects the variety and effectiveness of instructional techniques.
5. In the context of e-learning or remote education, electricity challenges can significantly impede students' ability to participate in online classes, access digital learning materials, and submit assignments. This hampers the potential of distance learning initiatives and exacerbates educational inequalities in rural areas.
6. Inadequate access to electricity restricts students' study time at home, especially during evening hours when natural light is limited. It affects their ability to complete homework, engage in self-study, or utilize digital resources for independent learning. This also leads to lower productivity and hinders academic progress.
7. Insufficient electricity supply impacts the safety and security of educational institutions. Dimly lit premises due to power outages can create unsafe environments for students, especially during early morning or late afternoon hours. It affects the functionality of security systems, making schools more vulnerable to security threats.

Some of the measures that can be taken to improve electricity issues includes –

1. Improving electricity infrastructure in rural areas through government initiatives and investments.
2. Implementing backup power solutions such as generators or solar power systems to mitigate the impact of power outages.
3. Promoting energy conservation measures to optimize electricity usage in educational institutions.
4. Training teachers on alternative teaching methods that do not rely heavily on electricity or technology.
5. Leveraging offline educational resources and offline-capable technology solutions to provide access to learning materials during electricity disruptions.

6. Encouraging community participation and collaboration to explore sustainable energy solutions and support the availability of reliable electricity in rural areas.

4.4.2.2. Availability of Smart Devices/ Phones and their usage –

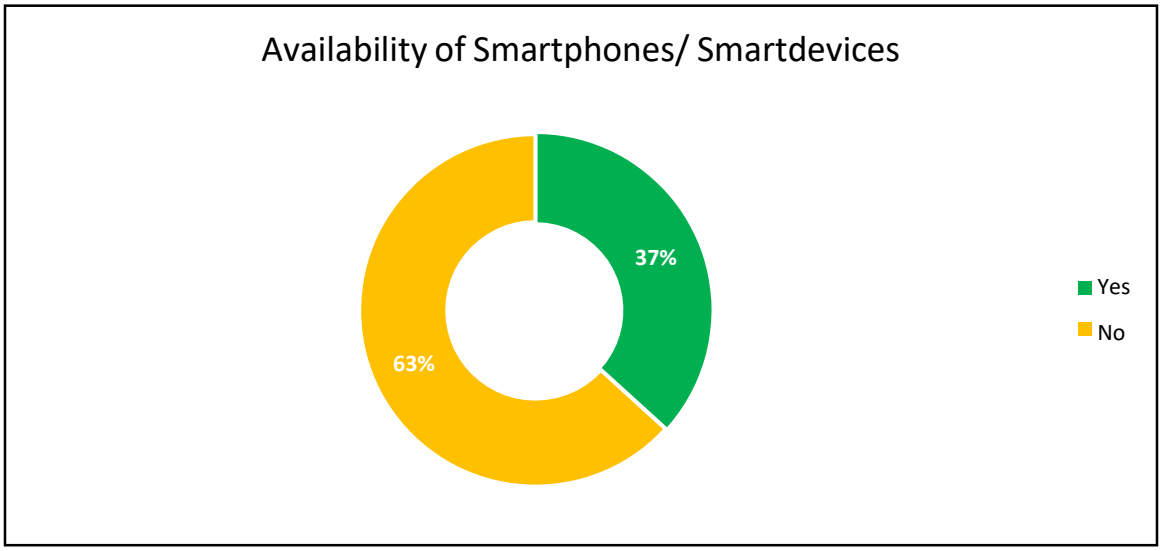

Figure 13 Availability of smart device to students participated in surveys conducted

From the responses received, it was noted that 63% of the students does not have any smart device or smart phone. This restricts them to all the digital initiatives and access to digital platforms developed for education.

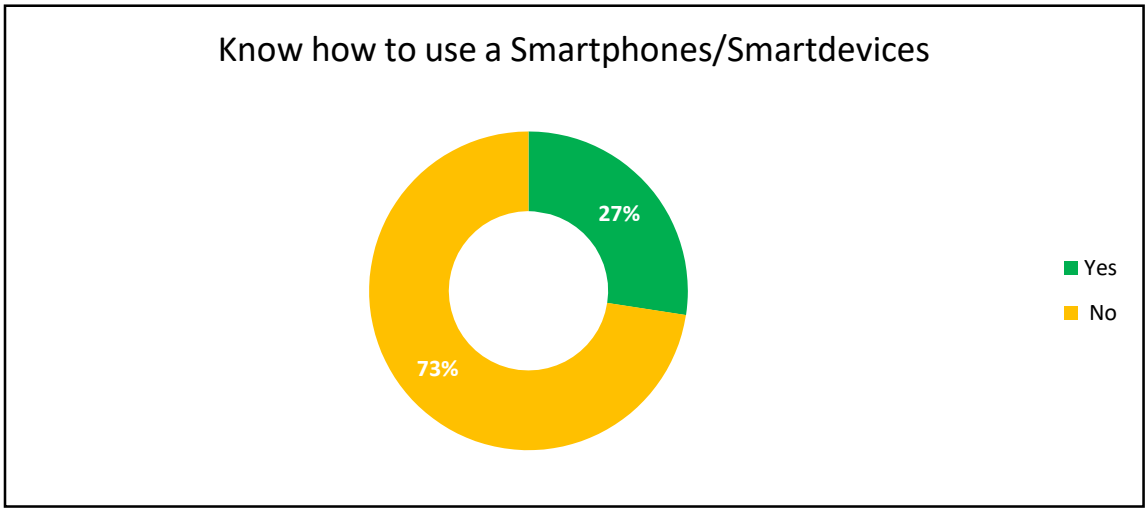

Figure 14 Awareness of smartphone/devices amongst students participated in surveys conducted

From the responses received, it was noted that 73% of the students does not even know how to use any smart device or smart phone. This creates a great hindrance even in case availability issue is solved.

4.4.2.3. Availability of Internet and Mode of Connectivity

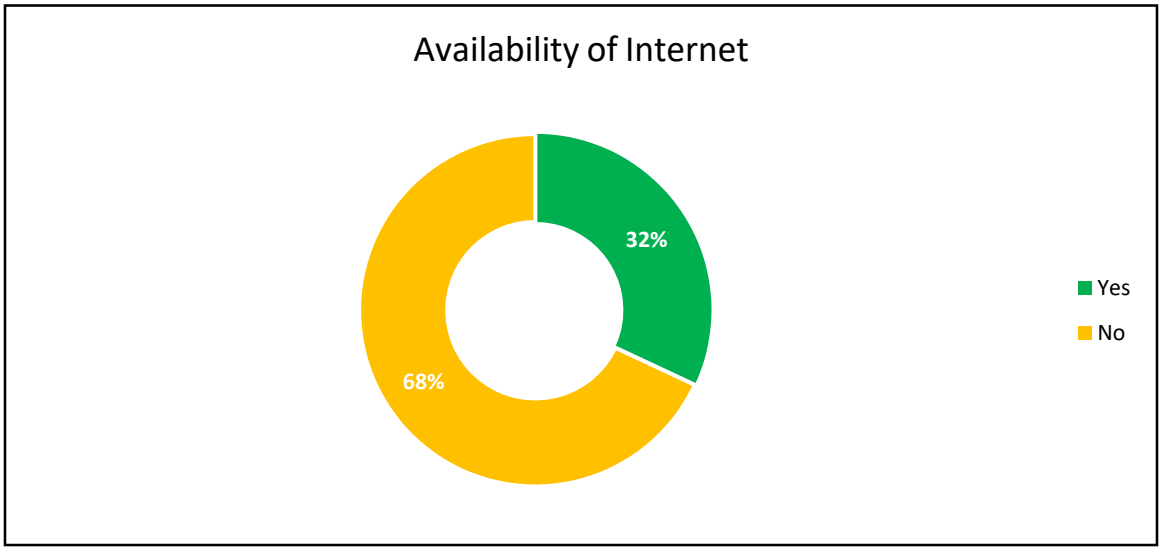

Figure 15 Availability of Internet in Rural Areas

From the survey response gathered, it was inferred that only 32% students have internet access and that is via Mobile Data. There are extremely limited or no Wi-Fi providers in rural India. Internet connectivity in rural India faces several challenges that hinder its availability and reliability. The lack of adequate infrastructure, such as fiber optic cables and telecom towers, poses a significant challenge to internet connectivity in rural areas. Limited infrastructure leads to poor network coverage, slower speeds, and intermittent connectivity.

Students in rural areas have limited or no access to reliable high-speed internet connections. Rural areas face various geographical barriers such as hilly terrain, dense forests, or remote locations, which pose challenges for establishing stable internet connectivity. Additionally, adverse weather conditions, such as heavy rainfall or storms, disrupt connectivity in rural areas (Specifically in North and East India).

Internet services and data plans are relatively expensive for rural populations, making them less affordable for many households. Excessive costs limit internet access and usage, particularly for low-income families and marginalized communities. Since Rural areas face inconsistent electricity supply, this directly impacts internet connectivity. Frequent power outages or unstable electricity disrupt internet services and hinder continuous access to the internet.

Rural areas have limited options when it comes to ISPs, with no providers extending their services to remote regions. Most of the students are reliant on 2G speed which they get through mobile devices.

Addressing these challenges requires a multi-faceted approach involving government initiatives, private sector involvement, and community participation. Some of the plans include -

1. **Infrastructure Development:** Expanding the telecommunication infrastructure in rural areas by increasing the number of telecom towers, extending fiber optic networks, and utilizing innovative technologies like satellite internet.
2. **Affordability and Subsidies:** Implementing policies and initiatives to make internet services and data plans more affordable for rural communities, including subsidies or discounted rates for low-income households.

3. **Digital Literacy and Awareness:** Promoting digital literacy programs and awareness campaigns to enhance digital skills, educate communities on the benefits of the internet, and ensure safe and responsible internet usage.
4. **Public-Private Partnerships:** Encouraging collaborations between government bodies, private sector organizations, and NGOs to improve internet connectivity in rural areas through shared infrastructure, investments, and innovative solutions.
5. **Renewable Energy Solutions:** Exploring the use of renewable energy sources, such as solar power, to address electricity challenges and ensure reliable internet connectivity in areas with inconsistent power supply.
6. **Community-based Initiatives:** Engaging local communities, NGOs, and grassroots organizations to develop community networks, establish internet access points, and promote digital inclusion in rural areas.

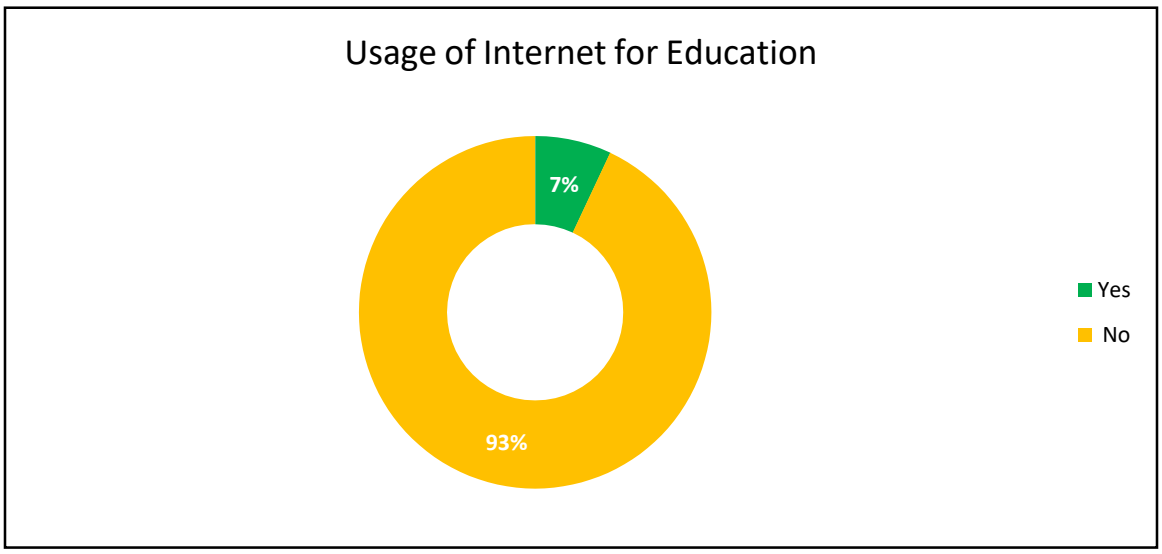

Figure 16 Usage of Internet by students in Rural Areas

It was also noted that only 7% of students uses Internet for education which is very less.

4.4.2.4. Usage of Smart Devices and Internet in Schools

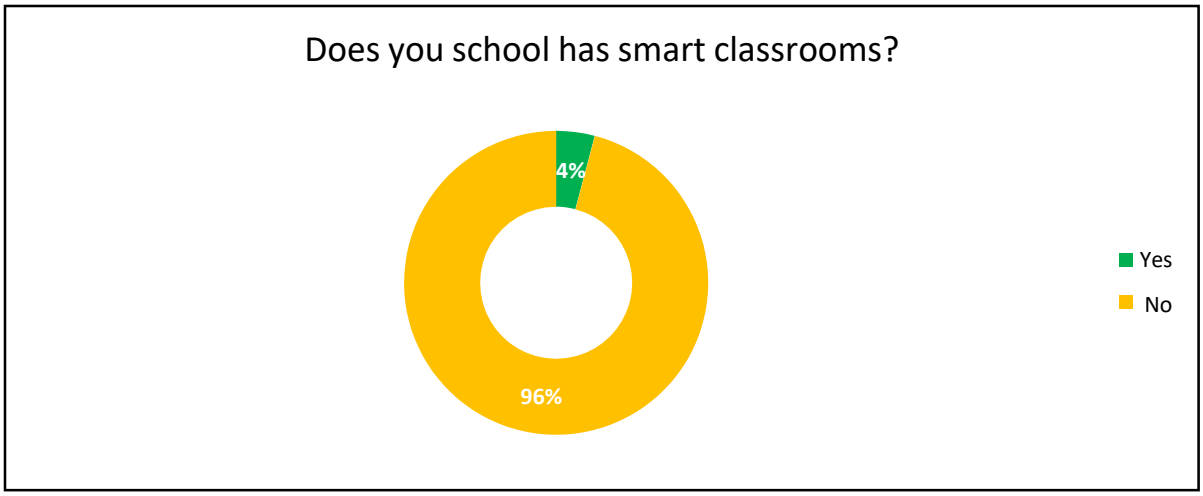

Figure 17 Availability of Smart classrooms in Schools

Only 4% of the schools had basic infrastructure for providing Digital education. 96% of the schools does not even have a smart classroom or devices for teaching students via digital mediums.

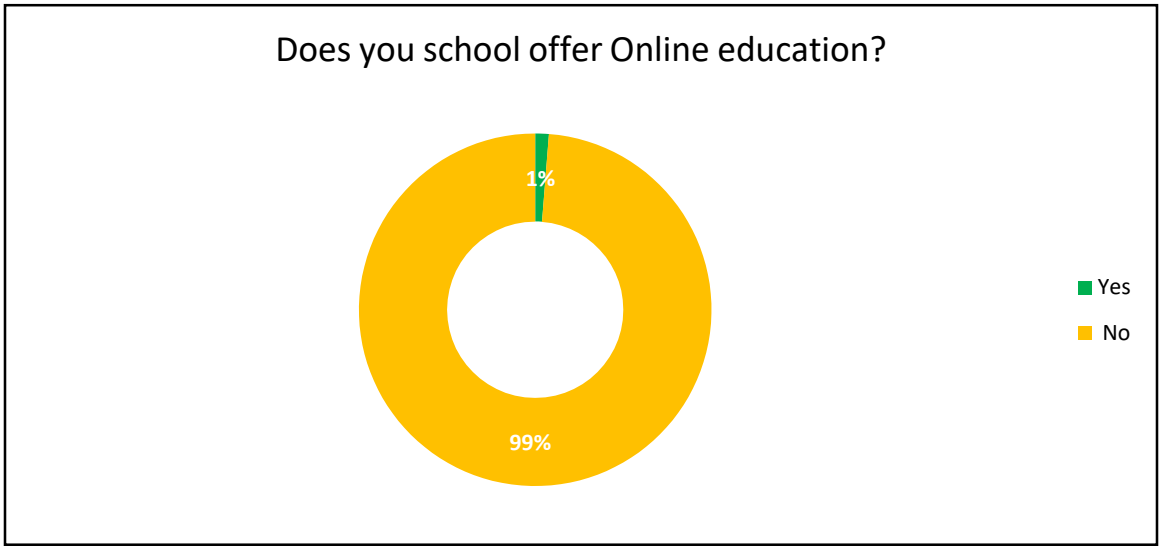

Figure 18 Online educations offered by schools

It was noted from the research that only 1% of the school offered online education. 99% of the schools still faces challenges in offering online education and adopting digital means of providing education.

Some of the challenges faced by schools includes –

Budgetary constraints limits schools' ability to invest in digital infrastructure, devices, and training. Limited financial resources make it challenging to provide the necessary resources for digital education, including purchasing devices, maintaining internet connectivity, and accessing relevant educational software and resources.

Limited or inadequate infrastructure, including a lack of computers, tablets, and reliable internet connectivity, poses a significant challenge for schools in rural areas. Schools may struggle to provide the necessary technology and internet access to support digital education.

Many students in rural areas do not have access to personal devices such as smartphones or computers at home. This lack of device ownership makes it challenging for schools to implement digital education initiatives that rely on individual device usage.

Students and teachers in rural areas have varying levels of digital literacy. While some students may be proficient in using digital tools, others may lack the necessary skills and confidence to effectively navigate digital platforms and resources.

Teachers in rural schools have limited training and exposure to digital tools and technologies. The lack of professional development opportunities focused on digital education hinders teachers' ability to incorporate technology effectively into their teaching practices.

Inadequate or unreliable electricity supply disrupts digital education efforts. Schools in rural areas face frequent power outages and have limited access to stable electricity, affecting the consistent use of digital devices and connectivity.

Addressing these challenges requires a multi-pronged approach involving various stakeholders, including the government, schools, teachers, and the community.

4.4.2.5.Awareness about Digital India Programme

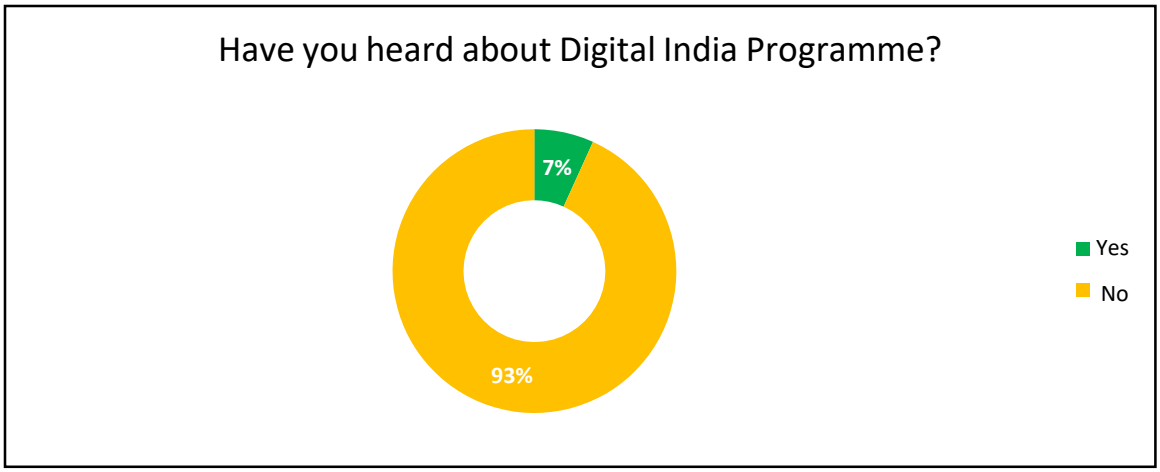

Figure 19 Awareness about Digital India programme

Only 7% of the students in the survey conducted had heard about Digital India programme. The students are not even aware about this programme creates a barrier in implementing it. Some of the measures which can spread awareness about this programme includes –

1. The government should take proactive measures to disseminate information about the Digital India program in rural areas. This includes organizing awareness campaigns, workshops, and information sessions specifically targeted at rural communities.
2. Engaging local government bodies and Panchayats to create awareness at the grassroots level. Utilizing their networks and platforms to reach out to rural communities and communicate the objectives, benefits, and opportunities of the Digital India program.
3. Conducting community outreach programs in rural areas to raise awareness. This involves organizing events, setting up information kiosks, and using local media channels such as community radio, pamphlets, and posters to disseminate information about the Digital India program.

4. Implementing digital literacy programs specifically designed for rural populations. These programs should focus on educating individuals about the benefits of digital technologies, internet usage, online safety, and digital skills development.
5. Identifying and collaborating with local champions and influencers who can effectively communicate the importance and advantages of the Digital India program to the rural population. These individuals can include respected community leaders, teachers, and local role models.
6. Schools play a vital role in spreading awareness among students and their families. Integrate digital literacy and awareness programs into the school curriculum and encourage students to actively participate in digital initiatives. Organize events and competitions related to digital education to foster interest and engagement.
7. Utilizing SMS campaigns, voice messages, mobile apps, and interactive voice response systems to reach individuals who may not have regular access to other forms of media.
8. Promoting continuous engagement with rural communities by providing regular updates, sharing success stories, and highlighting the impact of the Digital India program. This helps maintain interest, build trust, and encourage active participation.

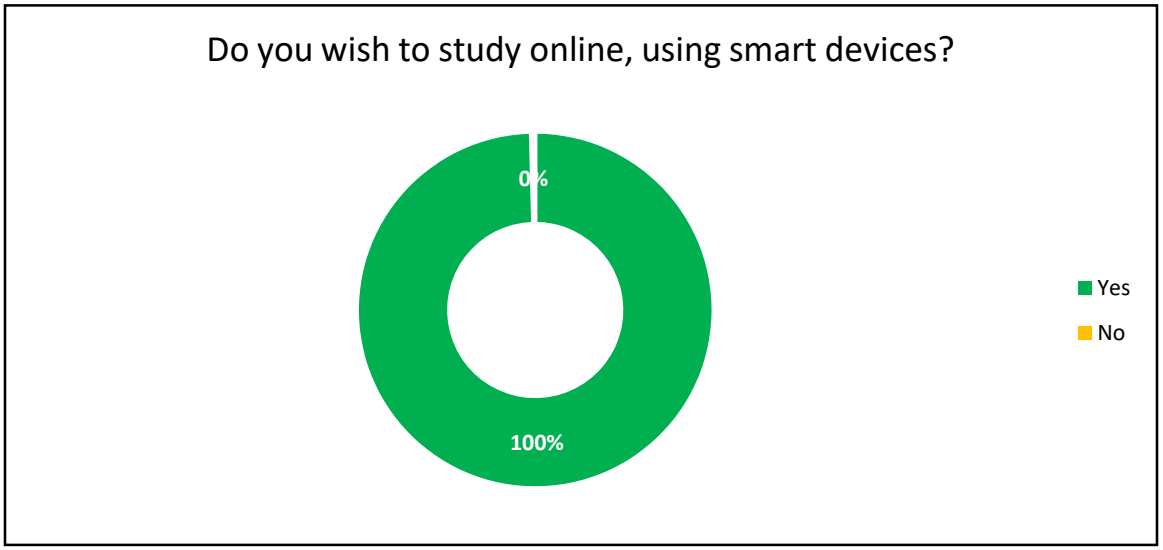

Figure 20 Willingness to study online

100% of the students have expressed their interest in learning through Digital mediums and platforms.

4.4.3. Education during COVID'19

This section presents a descriptive analysis of the sample, which provides an outline of the education during COVID. In this section, there were various questions asked from students including how education took place during COVID, who helped the students in their study, what kind of support was provided from school, and if they used any digital medium during that time.

4.4.3.1. How education took place during COVID?

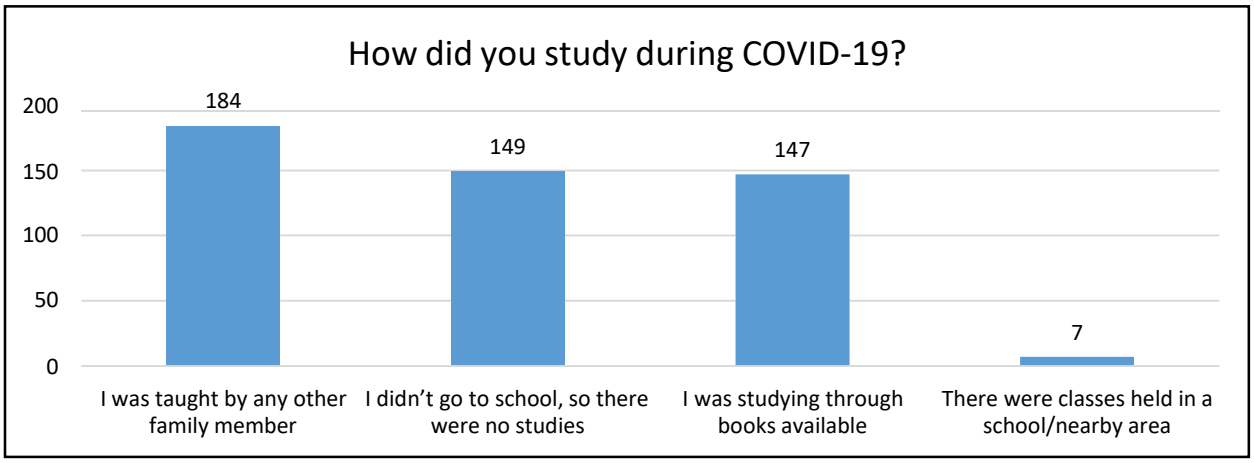

Figure 21 Education during COVID'19

In the survey questionnaire, it was asked that how the student's study during COVID'19 and four options were given along with open space if they have any other response. All the students selected out of these options and there were no responses received in the open space provided. It was noted from the responses received that about 38% of the students were taught by a family member (Mostly siblings). About 31% of the students did not go to school and no studies took place during that time. 30% of the students made an effort to study from the material available

including books, notes, and assignments, etc. Only 1% of the students said that there were classes help in nearby (Anganwadi/ NGOs) where they could go and attend the school. From this question it was observed that family member played a crucial role in supporting their children's education during the pandemic. They assisted with accessing available resources, facilitating learning at home, and ensuring regular engagement with educational materials and assignments.

Upon digging further and asking from teachers about the measures taken by school and government it was noted that schools and educational authorities distributed printed learning materials, such as textbooks, workbooks, and study guides, to students. These materials served as offline resources for students, however, students did not take interest in them. Also, in some cases, community learning centers were set up to provide a safe and controlled environment for students to access learning resources and receive guidance. These centers followed social distancing protocols and allowed limited student capacity. But due to fear of the pandemic most of the parents were not ready to send their kid here.

4.4.3.2. What kind of support was provided by the school?

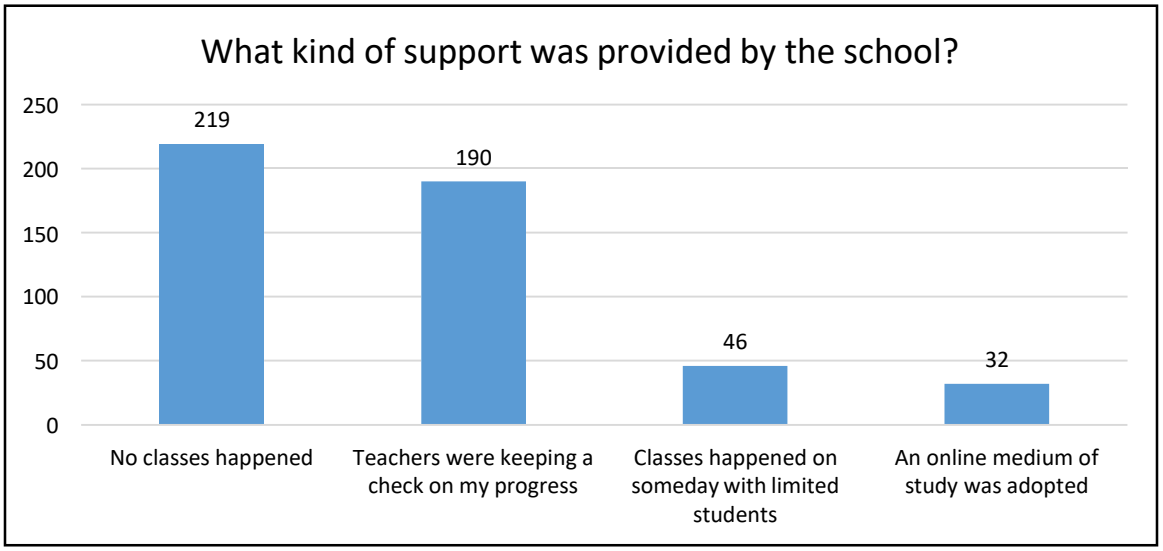

Figure 22 Support provided by Schools during COVID'19

From the survey responses, it was observed that at about 45% of the places no classes happened, and no support was provided from the schools. But on the contract at 39% of the places, teachers played a significant role and tracked students' performance. There was a challenge to call students to school at that time so different approaches were undertaken by the schools and teachers including –

1. Schools distributed learning materials such as textbooks, workbooks, study guides, and printed assignments to students. These materials allowed students to engage in self-study and complete assignments even without access to digital resources.
2. Schools continued to assign and collect assignments from students during the pandemic. Teachers provided clear instructions and guidelines for completing and submitting assignments, and they provided feedback on students' work to track their progress.
3. Teachers provided individualized support to students, addressing their specific learning needs and challenges. They offered guidance, clarification, and extra help through physical visits in the panchayat office of a district, one-on-one sessions, and phone calls.
4. Schools recognized the importance of addressing students' mental health and well-being during the pandemic. They provided guidance on coping with stress, anxiety, and uncertainty, and offered counseling services.
5. Schools actively engaged parents in supporting their children's learning at home. They provided guidance to parents on creating a conducive learning environment, monitoring progress, and assisting with assignments. Regular communication with parents helped maintain a strong home-school partnership.

In addition, it was observed that in approximately 9% of locations, a collaborative approach was taken between the school and students. This involved summoning students to the school premises on specific days in groups to monitor their progress, create a conducive learning environment, and address any doubts they may have. Furthermore, an online medium was adopted in approximately 7% of locations, utilizing platforms such as WhatsApp messages, group chats,

video calls, and more. These initiatives were particularly implemented in villages surrounding well-developed towns, including Delhi and Chennai.

4.4.3.3. Who helped in your studies?

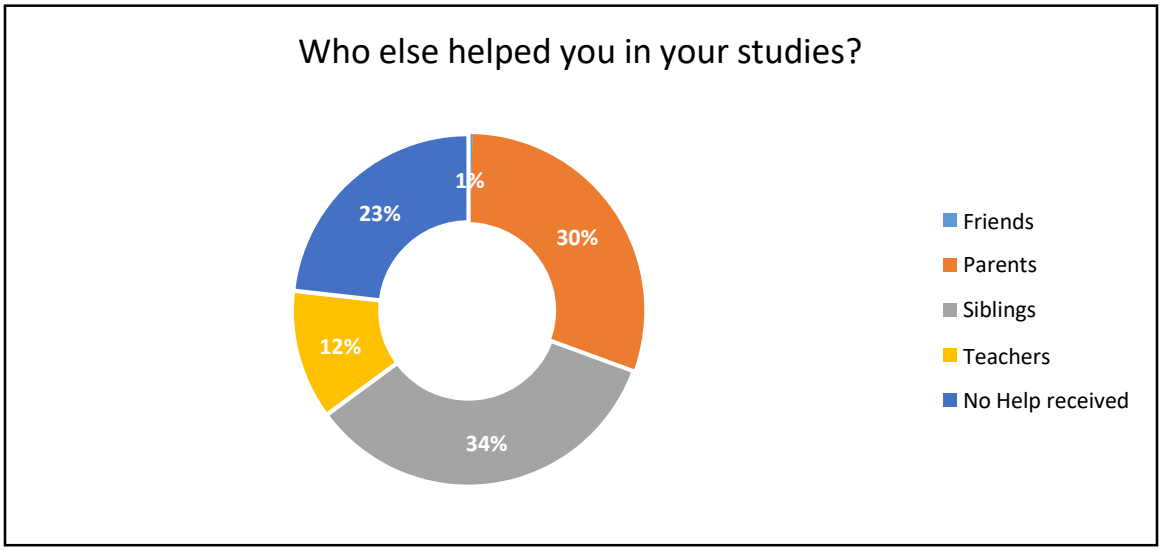

Figure 23 Additional support received during COVID'19

Out of the survey respondents, only 76% of the students provided their input on this question. It is understandable as some students did not receive any assistance and did not study during the COVID-19 period. Among the responses received, it was observed that the remaining students received support from various sources. Parents played a significant role in helping 30% of the students, while 34% received assistance from their siblings. Teachers also played a vital role in supporting 12% of the students, and 1% received help from their friends. All these stakeholders played a crucial role in nurturing a positive mindset towards education and contributing to the students' overall development.

4.4.3.4. Online Mediums adopted by schools and necessary training provided?

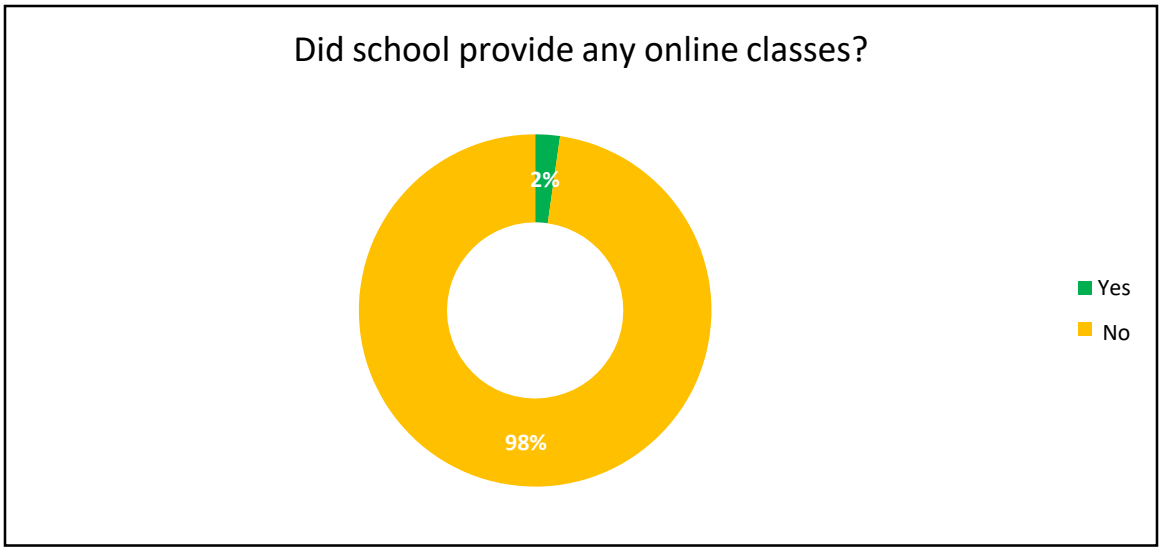

Figure 24 Online classes provided by schools

Based on the collected data, it was observed that online classes took place in only one location near the national capital of India, Delhi, which accounted for a mere 2% of the surveyed population. However, it was also noted that despite the occurrence of online classes, students in this location did not receive the necessary training on how to study effectively online. It is crucial to highlight that when adopting digital mediums, providing comprehensive training on the usage of platforms and mediums becomes essential to ensure students can fully utilize and benefit from these resources.

Below are some methods by which training can be provided to students –

1. **Step-by-Step Instructions:** Start by providing students with step-by-step instructions on how to navigate and use the digital platforms effectively. Break down the process into manageable tasks, guiding them through the registration process, accessing resources, submitting assignments, participating in discussions, and utilizing the features of the platform.

2. **Interactive Demonstrations:** Conduct interactive demonstrations to show students how to use the digital platform. Use screen sharing or recorded videos to walk them through various functionalities, highlighting important buttons, menus, and options. Encourage students to ask questions and clarify any doubts they may have.
3. **Practice Sessions:** Allow students to practice using the digital platform in a supervised environment. Provide them with sample assignments or activities that they can complete using the platform. Offer support and guidance during these practice sessions to ensure students become comfortable with the platform's features.
4. **Hands-on Activities:** Engage students in hands-on activities that require them to actively use the digital platform. This can include collaborative projects, online discussions, interactive quizzes, or virtual simulations. By actively participating, students gain practical experience and develop confidence in using the platform.
5. **Peer Learning and Support:** Encourage peer learning and support by promoting collaboration among students. Assign group projects or discussions that require students to work together on the digital platform. This allows them to learn from one another, share tips and tricks, and support each other in navigating the platform effectively.
6. **Ongoing Guidance and Feedback:** Provide ongoing guidance and feedback to students as they use the digital platform. Regularly check their progress, provide constructive feedback on their usage, and address any challenges or difficulties they may be facing. This helps students refine their skills and enhance their understanding of the platform.
7. **Digital Etiquette and Online Safety:** Incorporate training on digital etiquette and online safety as part of the digital platform training. Teach students about responsible online behavior, the importance of privacy and security, and how to avoid cyber threats. This ensures that students understand the ethical and safe use of digital platforms.

4.5. Summary of Findings

The Digital India Programme aimed to revolutionize education by leveraging technology to bridge the learning gap in rural areas. However, numerous challenges have hindered its effective implementation. Despite commendable initiatives under the Digital India Programme, rural India faced several obstacles. Limited infrastructure, including electricity and internet connectivity, posed significant challenges. Additionally, low digital literacy, language barriers, and financial constraints further hindered the adoption of digital education.

The COVID-19 pandemic intensified the challenges faced by rural education. School closures disrupted traditional classroom learning and limited or no study happened during this period. Though it was compelled that there would be a rapid shift towards online and remote education methods, it failed miserably due to the prevailing digital divide in rural areas.

Rural areas encountered difficulties in accessing online resources during the pandemic. Limited internet connectivity, lack of devices, and varying levels of digital literacy among students and teachers were major obstacles. As a result, many students lost interest in studying, leading to a concerning rise in dropouts.

Despite these challenges, schools in rural areas made some efforts to support students during the pandemic. They distributed learning materials, facilitated online learning platforms, conducted virtual classes, and provided guidance to students and parents. However, without having access to devices, infrastructure, and proper training and support, students struggled to engage with digital education.

Training on the usage of digital platforms was crucial to empower students, teachers, and parents to navigate online education effectively. Unfortunately, the lack of training efforts meant that students missed the opportunity to fully utilize digital resources, exacerbating the challenges faced in rural education.

Digital education providers highlighted a range of challenges in rural areas. These included limited infrastructure, the digital divide, connectivity issues, low digital literacy, language localization, teacher training, affordability, content quality, technical support, and student

engagement. Addressing these challenges is crucial for the success of digital education in rural India.

Spreading awareness about the Digital India Programme in rural areas is essential to encourage active participation and community engagement. Creating awareness will help address challenges related to awareness, access to resources, and government support. It will also empower stakeholders to actively participate and contribute to the growth of digital education.

Digital education in rural India holds immense potential to bridge the educational divide. However, various challenges, exacerbated by the COVID-19 pandemic, have hindered its progress. To overcome these hurdles, a comprehensive approach is required, including infrastructure development, training initiatives, support from schools, and increased awareness. By addressing these challenges, rural India can unlock the transformative power of digital education and provide equal opportunities for quality learning to all its students.

CHAPTER V:

DISCUSSION

5.1 Discussion of Results

From the research methods used including interview (with parents, teachers, NGO head, Anganwadi lead and Online education provider), observations during physical site visits and surveys, the answers to questions as proposed as part of research were received.

5.2 Discussion of Research Question One

What are the challenges faced by the rural education sector in implementing the Digital India Programme?

The challenges that are faced by the Rural education sector in implementing Digital India program as listed below –

1. **Limited Internet Connectivity:** Rural areas often face inadequate or unreliable internet connectivity, resulting in slow or intermittent internet access. This hampers the seamless delivery of online educational content, communication, and access to digital resources.
2. **Inadequate Electric Power Supply:** Many rural areas experience inconsistent or limited electricity supply, making it challenging to power digital devices and sustain their usage. Insufficient power infrastructure has hampered the effective implementation of digital education programs.
3. **Lack of Digital Infrastructure:** Rural areas lack the necessary digital infrastructure, such as computer labs, high-speed internet connections, and digital learning resources. This scarcity of infrastructure limits the availability and accessibility of digital education tools and resources for both teachers and students.
4. **Insufficient Hardware:** The availability and affordability of digital devices pose a significant challenge in rural areas. Students and schools have limited access to

computers, laptops, tablets, or smartphones, which are essential for effective participation in digital education activities.

5. **Infrastructure Maintenance:** Sustaining and maintaining digital infrastructure in remote and rural areas can be a challenge. Lack of technical support, limited funds for repairs, and inadequate training for maintenance staff can lead to infrastructure deterioration and hinder the long-term effectiveness of digital education initiatives.
6. **Connectivity Disparities:** Even within rural areas, there can be disparities in connectivity, with some regions having better access to internet services compared to others. This inequality further exacerbates the digital divide and hampers equal access to digital education opportunities.
7. **Challenges with Last-Mile Connectivity:** The last-mile connectivity refers to the challenge of extending internet connectivity from major infrastructure points to individual households or institutions. The remoteness and scattered nature of rural communities make it challenging to establish and maintain last-mile connectivity.
8. **Bandwidth Limitations:** In rural areas with limited internet infrastructure, bandwidth constraints can impact the speed and quality of internet connections. This can result in slower data transfer rates and difficulties in accessing online educational content.
9. **Limited Awareness:** One of the primary challenges is the lack of awareness about the Digital India Programme among stakeholders, including teachers, students, parents, and community members in rural areas. Insufficient knowledge about the program's objectives, components, and benefits can impede their active involvement and hinder the program's effectiveness.
10. **Limited Knowledge of Program among Teachers:** Teachers have limited knowledge about the specific objectives and goals of the Digital India Programme. This lack of awareness can prevent them from aligning their teaching practices with

the program's intended outcomes and hinder the successful integration of digital technologies in the classroom.

11. **Challenges in Implementing Digital Tools:** Lack of awareness about digital tools and resources provided through the Digital India Programme have made it difficult for teachers to effectively implement them in their teaching practices. They are not aware of the available educational apps, online platforms, or content repositories that can support their instruction.
12. **Limited Digital Literacy:** Teachers have limited digital literacy skills, which has hindered their ability to effectively use digital technologies in their teaching. This lack of awareness and proficiency in using digital tools has prevented them from fully capitalizing on the opportunities provided by the Digital India Programme.
13. **Insufficient Training and Professional Development:** Teachers have not received adequate training or professional development opportunities related to the Digital India Programme. This has contributed to their lack of awareness and confidence in utilizing digital technologies in their classrooms.
14. **Limited Government Support at the Grassroots Level:** The implementation of the Digital India Programme requires adequate support and coordination at the grassroots level. Insufficient government support, including training programs, capacity-building initiatives, or local facilitation, has impeded effective implementation and hindered stakeholder engagement in rural areas.
15. **Resource Allocation:** Limited resources and funding were allocated for awareness campaigns, training programs, and community engagement initiatives which have restricted the scope and effectiveness of government-supported activities. Insufficient resources have hindered the government's ability to create awareness and promote the Digital India Programme at the grassroots level.
16. **Budgetary constraints of schools:** Budgetary constraints limits schools' ability to invest in digital infrastructure, devices, and training. Limited financial resources

make it challenging to provide the necessary resources for digital education, including purchasing devices, maintaining internet connectivity, and accessing relevant educational software and resources.

5.3. Discussion of Research Question Two

To what extent has the Digital India Programme been successful in Rural India?

The Digital India program aimed to leverage digital technologies to improve governance, enhance access to services, promote digital literacy, and bridge the digital divide across the country. However, when examining its impact in rural India, it becomes evident that the program has been a failure and additional efforts are required to make it a success. The following findings substantiate this claim:

1. **Gender Disparity:** Research reveals that the majority of students benefiting from the program are male (57.3%). Gender disparities in the rural education sector continue to be a significant challenge. Despite the implementation of the Digital India program, there has been no increase in the percentage of females gaining access to education or the necessary resources to study.
2. **Large Families:** The survey shows that the majority of families in rural India (approximately 72%) consist of six or more members. Large families often struggle to provide adequate educational opportunities for all their children. Limited financial resources, coupled with the costs associated with education such as school fees, books, and uniforms, impede access to quality education for all family members. These financial burdens further hinder their ability to afford new technologies, including devices for online education or internet connections.
3. **Electricity Issues:** The responses indicate that electricity availability varies across different regions. Approximately 31% of places have electricity for 8-12 hours, while 29% have it for 12-16 hours. However, for 40% of places, electricity is available for less than 8 hours. As a whole, rural India only receives 10 hours of electricity per day, with no

defined schedule. The lack of consistent electricity poses various challenges that hinder the success of the Digital India program.

4. **Access to Devices:** Findings reveal that 63% of students do not have access to any smart device or smartphone. This limitation restricts their participation in digital initiatives and access to educational platforms developed for online learning. Additionally, 73% of students do not possess the knowledge of how to use smart devices or smartphones, creating a significant barrier even if devices were made available. Only 7% of students use the internet for educational purposes, indicating a low adoption rate.
5. **Infrastructure:** Merely 4% of schools have the basic infrastructure necessary for providing digital education. An alarming 96% of schools lack smart classrooms or devices for teaching students through digital mediums. Furthermore, only 1% of schools offer online education, while 99% face challenges in adopting digital means of education delivery.
6. **Knowledge about the Program:** Only 7% of surveyed students were aware of the Digital India program, indicating a lack of awareness among the target audience. The students' lack of knowledge about the program creates a significant barrier to its successful implementation.
7. **Online Classes and Trainings:** Data suggests that online classes took place in a single location near the national capital, Delhi, representing a mere 2% of the surveyed population. However, even in this location, students did not receive the necessary training on how to effectively study online. Comprehensive training on the usage of digital platforms becomes essential to maximize the benefits of online resources.

In conclusion, the Digital India program has faced numerous challenges in rural India. Gender disparities, large family sizes, limited infrastructure, lack of devices, low digital literacy, and inadequate awareness have hindered its effectiveness. To ensure success, it is imperative to address these challenges and provide comprehensive training and support for students, teachers,

and communities. Only then can digital education truly bridge the gap in rural India and empower students with the tools needed for a brighter future.

5.4. Discussion of Research Question Three

What are the perceptions of rural students, teachers, and parents towards the Digital India Programme?

The perceptions of rural students, teachers, and parents regarding the Digital India Programme vary based on their experiences and access to digital resources. During interviews, participants were asked about the perceived benefits of the program, and the following benefits were identified:

1. **Increased Access to Education:** The program is expected to provide students in underserved regions with access to educational content through digital platforms and online learning materials, regardless of their geographical location.
2. **Enriched Learning Experiences:** By integrating digital tools and resources into teaching and learning processes, the Digital India Programme aims to enhance the overall learning experiences of students. Interactive multimedia content, simulations, and virtual reality applications will make learning more engaging, interactive, and personalized.
3. **Enhanced Teaching Effectiveness:** Digital technologies will empower teachers with innovative tools, teaching aids, and online resources, enabling them to enhance their instructional practices. Teachers will be able to utilize digital platforms for lesson planning, content delivery, and student assessments, catering to diverse learning needs more effectively.
4. **Promoting Digital Literacy:** The program will equip students with the necessary skills to navigate digital platforms, critically evaluate information, use productivity tools, and engage responsibly and safely in the digital space.

5. **Bridging the Digital Divide:** By providing resources and infrastructure in rural and underserved areas, the program aims to reduce disparities in access to educational opportunities, bridging the digital divide.
6. **Skill Development for the Future:** The Digital India Programme will equip students with essential digital literacy, problem-solving, collaboration, and critical thinking skills, enhancing their value in the workforce.

Additional perceptions expressed include:

1. **Opportunity for Education Enhancement**: Many rural students, teachers, and parents perceive the Digital India Programme as an opportunity to enhance education. They believe that digital technologies have the potential to provide access to quality resources, improve learning outcomes, and expand educational opportunities beyond traditional classrooms.
2. **Empowerment and Skill Development:** Students and parents see the program as a means of empowerment and skill development. They recognize the importance of digital literacy and technology skills in today's world and view the program as an opportunity to acquire these skills for better educational and career prospects.
3. **Challenges of Implementation:** Some participants have expressed challenges in implementing the Digital India Programme, including limited connectivity, infrastructure gaps, lack of training and support, language barriers, and difficulties in effectively accessing and utilizing digital resources.
4. **Optimism for Change:** Despite the challenges, there is optimism among rural students, teachers, and parents regarding the potential of the Digital India Programme to bring about positive change. Students have shown a strong interest in learning through digital mediums, and they appreciate the government's efforts to bridge the digital divide and promote digital inclusion in rural areas. They hope for improvements in access to education, healthcare, and other essential services through digital means.

5. **Need for Continued Support**: Rural participants emphasize the need for sustained support and investment in digital infrastructure, connectivity, training, and access to devices. They stress the importance of ongoing efforts to address challenges and ensure equitable access to digital resources and opportunities.

Overall, the Digital India Programme has generated a range of perceptions, highlighting both the potential benefits and the challenges that need to be addressed for successful implementation in rural India.

5.5. Discussion of Research Question Four

How has the pandemic affected the education sector for rural students and teachers?

From the responses received in the interview, it was well understood that no online medium was used to promote Digital education in rural India. It is evident that no or limited learning happened during COVID'19. Though some of the alternative teaching methods were adopted by teachers and schools including rotational study plans and home assignments etc. there was no mention of the usage of digital tools to provide education. This was due to a lack of Digital infrastructure in villages and unawareness of the program among teachers and students. When asked about how COVID'19 impacted a child's mindset various responses were received. Based on the themes and responses received, the following COVID'19-related challenges were found, which are listed below –

1. The sudden closure of schools and the shift to remote learning disrupted the normal academic routine of students. The uncertainty and prolonged absence from the classroom led to a sense of disengagement and reduced motivation to go to school among students in rural areas.
2. In some cases, students in rural areas had to take on additional responsibilities during the pandemic. They got involved in household chores, caring for siblings or family members, or engaging in income-generating activities. These responsibilities

impacted their ability to focus on their studies and their overall mindset toward education.

3. The pandemic prompted some students in rural areas to reassess their priorities and aspirations. Economic hardships and disruptions in education led to a shift in focus towards immediate needs and concerns, potentially impacting their mindset toward long-term educational goals.

In the survey questionnaire, it was asked that how the student's study during COVID'19 and four options were given along with open space if they have any other response. All the students selected out of these options and there were no responses received in the open space provided. It was noted from the responses received that about 38% of the students were taught by a family member (Mostly siblings). About 31% of the students did not go to school and no studies took place during that time. 30% of the students made an effort to study from the material available including books, notes, and assignments, etc. Only 1% of the students said that there were classes help in nearby (Anganwadis/ NGOs) where they could go and attend the school. From this question it was observed that family member played a crucial role in supporting their children's education during the pandemic. They assisted with accessing available resources, facilitating learning at home, and ensuring regular engagement with educational materials and assignments.

Upon digging further and asking from teachers about the measures taken by school and government it was noted that schools and educational authorities distributed printed learning materials, such as textbooks, workbooks, and study guides, to students. These materials served as offline resources for students, however, students did not take interest in them. Also, in some cases, community learning centers were set up to provide a safe and controlled environment for students to access learning resources and receive guidance. These centers followed social distancing protocols and allowed limited student capacity. But due to fear of the pandemic most of the parents were not ready to send their kid here.

It was also observed that at about 45% of the places no classes happened, and no support was provided from the schools. But on the contract at 39% of the places, teachers played a significant role and tracked students' performance. There was a challenge to call students to school at that time so different approaches were undertaken by the schools and teachers including –

1. Schools distributed learning materials such as textbooks, workbooks, study guides, and printed assignments to students. These materials allowed students to engage in self-study and complete assignments even without access to digital resources.
2. Schools continued to assign and collect assignments from students during the pandemic. Teachers provided clear instructions and guidelines for completing and submitting assignments, and they provided feedback on students' work to track their progress.
3. Teachers provided individualized support to students, addressing their specific learning needs and challenges. They offered guidance, clarification, and extra help through physical visits in the panchayat office of a district, one-on-one sessions, and phone calls.
4. Schools recognized the importance of addressing students' mental health and well-being during the pandemic. They provided guidance on coping with stress, anxiety, and uncertainty, and offered counseling services.
5. Schools actively engaged parents in supporting their children's learning at home. They provided guidance to parents on creating a conducive learning environment, monitoring progress, and assisting with assignments. Regular communication with parents helped maintain a strong home-school partnership.

In addition, it was observed that in approximately 9% of locations, a collaborative approach was taken between the school and students. This involved summoning students to the school premises on specific days in groups to monitor their progress, create a conducive learning environment, and address any doubts they may have. Furthermore, an online medium was adopted in approximately 7% of locations, utilizing platforms such as WhatsApp messages, group chats,

video calls, and more. These initiatives were particularly implemented in villages surrounding well-developed towns, including Delhi and Chennai.

Based on the collected data, it was observed that online classes took place in only one location near the national capital of India, Delhi, which accounted for a mere 2% of the surveyed population. However, it was also noted that despite the occurrence of online classes, students in this location did not receive the necessary training on how to study effectively online. It is crucial to highlight that when adopting digital mediums, providing comprehensive training on the usage of platforms and mediums becomes essential to ensure students can fully utilize and benefit from these resources.

5.6. Discussion of Research Question Five

What measures can be taken to improve the implementation and effectiveness of the Digital India Programme in rural education?

To improve the implementation and effectiveness of the Digital India Programme in rural education, several measures can be taken. Some of them are listed below:

Investing in the development of digital infrastructure, including improving internet connectivity, expanding network coverage, and ensuring reliable power supply in rural areas. This will enable seamless access to online resources and digital platforms.

Providing affordable access to digital devices such as computers, laptops, tablets, and smartphones to students in rural areas. This can be done through initiatives like subsidized device distribution or setting up community digital centers where students can access devices for educational purposes.

Exploring innovative solutions to overcome connectivity challenges in remote areas, such as satellite-based internet connectivity, mobile internet hotspots, or offline content distribution through localized servers or offline storage devices.

Conducting comprehensive digital literacy programs for students, teachers, and parents to enhance their knowledge and skills in using digital tools and platforms. This should include

training on internet usage, online safety, information literacy, and effective utilization of digital educational resources.

Developing and curate educational content that is localized, culturally relevant, and aligned with regional languages and curriculum requirements. This will improve students' engagement and comprehension of the content.

Providing training and professional development opportunities for teachers in rural areas to effectively integrate digital technologies into their teaching practices. This should include training on using digital platforms, designing online lessons, and incorporating interactive multimedia resources.

Fostering partnerships between government agencies, educational institutions, NGOs, and private sector organizations to leverage their expertise, resources, and networks. Collaborative efforts can lead to better implementation, knowledge sharing, and improved access to technology and educational resources.

Implementing a robust monitoring and evaluation system to assess the impact and effectiveness of digital education initiatives in rural areas. This will help identify areas for improvement, measure learning outcomes, and make informed decisions for future interventions.

Conducting awareness campaigns and community engagement programs to educate rural students, teachers, parents, and community members about the benefits and opportunities offered by the Digital India Programme. This will create a supportive environment and encourage active participation.

Establishing feedback mechanisms to gather inputs, suggestions, and concerns from students, teachers, and parents regarding the implementation of digital education initiatives. This feedback should be used to improve the programs and address any challenges or gaps identified.

Implementing these measures requires collaborative efforts from government agencies, educational institutions, community organizations, and other stakeholders. It is crucial to ensure sustained commitment, adequate funding, and a participatory approach to bring about

meaningful and long-lasting improvements in rural education through the Digital India Programme.

5.7. Discussion of Research question six

What all businesses can be developed as the benefit of this programme?

The Digital India Programme opens up opportunities for various businesses and entrepreneurship in India, particularly in the digital and technology sectors. Some of the potential business ideas that can be developed as a benefit of this program includes –

1. **Digital Skills Training and Certification:** Entrepreneurs can start a business that provides digital skills training programs and certification courses to individuals, including students, professionals, and parents. This can include training on digital literacy, coding, data analytics, digital marketing, and e-commerce.
2. **E-Learning Platforms:** Entrepreneurs can develop an e-learning platform that offers online courses and educational content tailored to the needs of rural students. This can include subjects aligned with regional curriculum requirements, language localization, and interactive learning materials.
3. **Internet Service Providers**: Entrepreneurs can establish an internet service provider (ISP) company that focuses on expanding Internet connectivity and broadband services in rural areas. This can involve setting up wireless networks, offering affordable data plans, and providing reliable internet services to schools, communities, and individuals.
4. **Digital Content Creation:** Entrepreneurs can start a business that specializes in creating digital content, such as educational videos, animations, interactive modules, and e-books. This content can be designed for various educational levels and subjects, catering to the needs of rural students and teachers.
5. **Online Tutoring and Mentoring:** Entrepreneurs can launch an online tutoring platform that connects qualified teachers and tutors with rural students who need additional academic

support. This can involve offering personalized tutoring sessions, homework help, exam preparation, and mentoring programs.

6. **Mobile App Development:** Entrepreneurs can build mobile applications that cater to the specific needs of rural communities, such as apps for agricultural information, healthcare services, local marketplaces, skill development, and government schemes. These apps can be designed to work effectively with low-bandwidth connections and regional languages.
7. **Last-Mile Delivery Solutions:** Entrepreneurs can create a logistics and delivery company that focuses on last-mile delivery of goods and services in rural areas. This can involve partnering with e-commerce platforms, local businesses, and government agencies to ensure timely and efficient delivery to remote locations.
8. **Digital Financial Services:** Entrepreneurs can develop a business that offers digital financial services, such as mobile banking, payment gateways, digital wallets, and microfinance solutions. This can help rural communities access secure and convenient financial services, facilitate online transactions, and promote financial inclusion.
9. **Rural Healthcare Technology:** Entrepreneurs can build technology solutions for rural healthcare, including telemedicine platforms, health monitoring devices, and electronic medical record systems. These solutions can help bridge the healthcare gap in remote areas and improve access to quality medical services.
10. **Digital Marketing and Branding:** Entrepreneurs can start a digital marketing agency that helps businesses in rural areas build an online presence, develop effective marketing strategies, and promote their products and services to a wider audience. This can involve social media marketing, search engine optimization, and website development.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1. Summary

The research on the performance of the Digital India Programme in the rural education sector in India, with a post-COVID analysis, aims to evaluate the effectiveness and impact of the program in improving education outcomes in rural areas. It also focused on analyzing what challenges have been incurred in the effective implementation of the program, what could be the possible solutions for making this programme successful, and what all businesses can be developed as a result of this.

The Digital India Programme has made some efforts to improve digital infrastructure in rural areas. However, challenges such as limited connectivity, infrastructure gaps, inadequate electricity supply, and inadequate access to devices persist, hindering the seamless implementation of digital education initiatives in rural India. The program has planned to expand access to digital education resources, online learning platforms, and e-content in rural India. While these plans will provide new learning opportunities to rural students, there are disparities in access due to the digital divide, particularly concerning internet connectivity and the availability of devices.

As per the findings, The Digital India program aimed to leverage digital technologies to improve governance, enhance access to services, promote digital literacy, and bridge the digital divide across the country. However, when examining its impact in rural India, it becomes evident that the program has been a failure and additional efforts are required to make it a success.

The research highlights the importance of digital literacy and capacity building among teachers, students, and parents in rural areas. Training programs and initiatives should be built that focus on digital literacy and there is a need for sustained efforts to enhance digital skills and knowledge. Along with this the research also identifies several challenges in the implementation of digital education initiatives in rural India. These challenges include limited awareness, lack of

technical support, language barriers, and the need for customized content that aligns with local languages and curricula.

The research examines the impact of the Digital India Programme on learning outcomes in rural areas. While there are some indications of improved access to educational resources, more comprehensive and rigorous evaluations are required to assess the direct impact on student learning outcomes and academic performance. There is a need for collaboration among government bodies, educational institutions, NGOs, entrepreneurs, and other stakeholders as this is crucial for the effective implementation of digital education initiatives. The research emphasizes the need for strong partnerships to address challenges and ensure sustained support for rural education.

From the research, it was well understood that no online medium was used to promote Digital education in rural India. It is evident that no or limited learning happened during COVID'19. Though some of the alternative teaching methods were adopted by teachers and schools including rotational study plans and home assignments etc. there was no mention of the usage of digital tools to provide education. This was due to a lack of Digital infrastructure in villages and unawareness of the program among teachers and students. While there were measures taken to promote offline education, there is a need to understand the importance of the digital medium and resolve the challenges at the earliest to mitigate the shortcoming of offline education.

To improve the implementation and effectiveness of the Digital India Programme in rural education, various measures can be taken. These include investing in digital infrastructure, providing affordable access to devices, exploring innovative connectivity solutions, conducting comprehensive digital literacy programs, developing localized educational content, training and supporting teachers, fostering partnerships, implementing monitoring and evaluation systems, conducting awareness campaigns, establishing feedback mechanisms, and promoting collaboration among stakeholders. These measures require sustained commitment, adequate funding, and a participatory approach to bring about meaningful improvements in rural education through the Digital India Programme.

The Digital India Programme offers opportunities for business and entrepreneurship in India, particularly in the digital and technology sectors. Some potential business ideas include digital skills training and certification, e-learning platforms, internet service providers, digital content creation, online tutoring and mentoring, mobile app development, last-mile delivery solutions, digital financial services, rural healthcare technology, and digital marketing and branding. These businesses can cater to the needs of rural communities, provide access to educational resources, improve connectivity, enhance financial services, bridge healthcare gaps, and promote online presence and marketing for rural businesses.

6.2. Implications

The implications of research on the effectiveness of the Digital India Programme in rural India are significant and inform policymakers, entrepreneurs, and other stakeholders about program implementation in rural India and possible future initiatives.

The research findings will help policymakers refine existing policies related to the Digital India Programme and rural education. The research provides insights into areas that require attention, identifies gaps in implementation, and guides policy revisions for better outcomes. This Research also highlights the strengths and weaknesses of the Digital India Programme in rural education. The findings in the research should be used to enhance program design, improve implementation strategies, and prioritize areas that need more attention or resources.

The Research informs about resource allocation decisions by identifying areas of the Digital India Programme that have the greatest impact on rural education. Resources should be adequately provided to address specific challenges, improve infrastructure, enhance training programs, and ensure equitable access to digital resources.

The research also highlights the need for capacity-building initiatives for teachers, students, and parents in rural areas. It will guide the development of training programs and professional development opportunities to enhance digital literacy and ensure the effective utilization of digital tools and resources.

The findings from the research facilitate stakeholder engagement and collaboration. The research provides evidence-based insights about the engagement of government agencies, educational institutions, NGOs, network providers, private sector organizations, and entrepreneurs. These stakeholders should put in efforts to improve the effectiveness of the Digital India Programme in rural education. The research also serves as a foundation for future program planning and implementation. It guides the development of new initiatives, identifies areas for innovation, and shapes the roadmap for the future of digital education in rural India.

The research findings should be shared with relevant stakeholders, including policymakers, educators, and the research community. Disseminating research outcomes will facilitate knowledge sharing, foster dialogue, and promote evidence-based decision-making for the Digital India Programme and similar initiatives. Research on the effectiveness of the Digital India Programme in rural India have practical implications that contribute to improving digital education outcomes, enhancing access to resources, and empowering rural communities through technology.

6.3. Recommendations for Future Research

Future research on the effectiveness of the Digital India Programme in rural India will further enhance our understanding of the program's impact and provide insights for improved implementation.

Longitudinal studies should be conducted to examine the long-term effects of the Digital India Programme on educational outcomes in rural areas. This will help assess the sustained impact of digital interventions over time and identify factors that contribute to long-term success.

Comparative studies should be conducted to evaluate the effectiveness of different digital interventions and approaches within the Digital India Programme. This involves comparing various digital platforms, content delivery models, training programs, and infrastructure strategies to identify best practices and determine the most effective approaches for different contexts.

Rigorous studies should be done that measures the impact of the Digital India Programme on specific learning outcomes, such as academic performance, digital literacy, critical thinking, and problem-solving skills. This will provide concrete evidence of the program's effectiveness in improving educational outcomes in rural areas.

Further exploration of teachers' perspectives in rural areas is essential to understand the implementation and effectiveness of digital education initiatives. Regular investigations into their experiences, challenges, and training needs will inform strategies for better support and professional development.

The role of parents and the community in supporting and engaging with digital education initiatives should also be examined regularly, including factors influencing parental involvement, community support, and their impact on student learning outcomes.

It is crucial to investigate the equity and inclusion aspects of the Digital India Programme in rural education, assessing whether the program has successfully reached marginalized and disadvantaged communities, and identifying strategies for equitable access and participation.

Innovative approaches should be explored to address the unique challenges of rural education through digital interventions, including the use of emerging technologies, gamification, personalized learning, adaptive learning platforms, and virtual reality. Cost-benefit analyses should be performed to assess the economic implications and return on investment of the Digital India Programme in rural education, considering infrastructure development, training programs, device provision, and maintenance costs against the educational and societal benefits achieved.

The sustainability and scalability of digital education initiatives in rural areas should be evaluated, focusing on factors contributing to sustainability, challenges in scaling up, and strategies for long-term viability and impact.

Lastly, study from different regions at regular intervals could be done to underatand the impact of digital India proramme in that region. New methods of research could also be studied and used including regression analysis of marks obtained by students before and after using digital means. This will provide understading of how impactful are digital Initiatives.

6.4. Conclusion

In conclusion, the research on the effectiveness of the Digital India Programme in rural India, with a post-COVID analysis, highlights the potential of digital interventions in transforming rural education. Though the Digital India Programme has made significant strides in improving digital infrastructure, expanding access to digital resources, and enhancing digital literacy in rural areas, several challenges persist, including the digital divide, connectivity issues, lack of awareness, and limited technical support.

The research underscores the importance of addressing these challenges to maximize the impact of the Digital India Programme. It emphasizes the need for continued investment in digital infrastructure, affordable access to devices, comprehensive digital literacy programs, and localized educational content. Additionally, the research highlights the significance of training and capacity building for teachers, active stakeholder collaboration, rigorous monitoring and evaluation mechanisms, and community engagement.

While the Digital India Programme has shown promising results in improving access to education resources and promoting digital learning in urban areas, there is a need for further research to assess its long-term impact on learning outcomes, address equity issues, and identify best practices for rural areas. Future research should also explore innovative approaches, cost-effectiveness, and sustainability of digital education initiatives in rural India.

Overall, the findings of this research provide valuable insights for policymakers, educators, entrepreneurs, and other stakeholders to enhance the implementation and effectiveness of the Digital India Programme in rural education. By addressing the identified challenges and implementing the recommended measures, there is great potential to bridge the digital divide, empower rural communities, and improve educational outcomes in rural India.

APPENDIX A

SURVEY COVER LETTER

I hope this letter finds you in good health and high spirits. My name is Tushar Bhageria, and I am a research student at the Swiss School of Business Management, Geneva. I am writing to invite you to participate in an important research survey focused on evaluating the effectiveness of the Digital India program in rural India.

Digital India, an ambitious initiative launched by the Government of India, aims to transform the nation into a digitally empowered society and knowledge economy. The program has introduced several key initiatives to bridge the digital divide and empower citizens with access to information, services, and opportunities.

The primary objective of my research study is to understand the impact of the Digital India program on the lives of students, teachers, and parents residing in rural areas. By conducting this survey, I seek to gather valuable insights from students who have directly experienced the benefits, challenges, and overall effectiveness of the Digital India program in rural India.

Your participation in this research survey will provide me with valuable data to assess the program's achievements, identify areas of improvement, and inform policymakers about the real-life experiences and perceptions of individuals directly affected by the Digital India program.

Participating in this research survey is voluntary, and your responses will be kept strictly confidential and used only for research purposes. Your anonymity will be maintained throughout the study, and your personal information will not be shared with any third parties. The survey is expected to take approximately 20 minutes to complete, and your time and efforts will be highly appreciated.

To participate in the survey, please follow the enclosed link Google Form. If you have any questions or concerns regarding the survey or the research study, please do not hesitate to contact me at +91 9015116640 or Tushar.bhageria96@gmail.com. I will be more than happy to address any queries you may have.

I sincerely hope that you will consider participating in this research survey. Your valuable contribution will help me gain a comprehensive understanding of the impact of the Digital India program in rural areas and contribute to its further success.

Thank you very much for your time and consideration.

Tushar Bhageria

+91 9015116640

Tushar.bhageria96@gmail.com

APPENDIX B

SURVEY QUESTIONNAIRE

Demographic Details

1. Name _____
2. Age _____
3. Gender _____
4. Village/City _____
5. How many members are there in your family? _____
6. How many siblings do you have? _____
7. Do you go to school? _____
8. Name of your school _____
9. Standard/Class in which you are studying

   ☐Nursery to KG ☐6^{th} to 10^{th}

   ☐1^{st} to 5^{th} ☐11^{th} or 12^{th}

10. What type of school is it?

    ☐Government School ☐NGO

    ☐Private School ☐Anganwadi school

    ☐Home Schooling

11. How far is your school from your home?

    ☐0 -1km ☐2-4 km

    ☐1- 2 km ☐>4 km

12. How do you commute?

    ☐Walking ☐Van

    ☐Guardian Drop me ☐Any other

    ☐Bus

Availability of resources

1. Is there electricity available in your village/city?

   ☐Yes ☐No

2. What is the duration for the availability of electricity in a day

   ☐0-4 hours ☐12-16 hours

   ☐4-8 hours ☐>16 hours

   ☐8-12 hours

3. Do you have a laptop, tablet, computer, or smartphone?

   ☐Yes ☐No

   If yes, please specify _____

4. Do you have internet access?

   ☐Yes ☐No

5. Is it via data internet or Wi-Fi?

   ☐Mobile Data ☐Wi-Fi

6. Do you know how to use a smartphone?

   ☐Yes ☐No

7. Do you use internet for education?

   ☐Yes ☐No

8. Does your school have a smart classroom?

   ☐Yes ☐No

9. Does your school offer online education?

   ☐Yes ☐No

Internet access ☐No

1. Have you heard about the Digital India programme?

   ☐Yes

☐Have just heard about it

2. Do you know about any government schemes for online education?

   ☐Yes ☐No

   If yes, please specify_____

3. Do you wish to study online, using smart devices?

   ☐Yes ☐No

During COVID

1. How did you study during COVID time?

   ☐I did not go to school, so there were no studies

   ☐I was studying through books available

   ☐I was taught by any other family member

   ☐There were classes held in a school/nearby area

   Any other_____

2. What kind of support was provided by the school?

   ☐Classes happened on someday with limited students

   ☐Study materials were sent to the home

   ☐An online medium of study was adopted

   ☐Teachers were keeping a check on my progress

   ☐I had to go to school to give exams

   ☐No classes happened

   Any other_____

3. Did school provide any online classes?

   ☐Yes ☐No

4. If yes, was there any kind of training provided to attend online classes?

   ☐Yes ☐No

☐Not Applicable

5. Did you use any smart phone or any other devices to study from home during COVID?

   ☐Yes ☐No

6. Were you able to understand through online mediums?

   ☐Yes ☐Not Applicable

   ☐No

7. Who else helped you in your studies?

   ☐Parents

   ☐Siblings

   ☐Teachers

   ☐School

   ☐Friend

APPENDIX C

INFORMED CONCENT

I am a Doctoral student at the Swiss School of Business and Management. I am doing research on understanding the effectiveness of the Digital India program in rural India. The data collected from this questionnaire is exclusively for research purposes and may be used in academic publications or referred to by other researchers. I am now in a position to evaluate my assumptions with a sample of respondents, which is the reason why I am contacting you.

I would appreciate your participation in this survey which will only take 10 minutes of your time. All information provided will be treated in the strictest confidence. Participation is voluntary and the anonymity and confidentiality of the matter will be respected. No participants will be identified in the thesis and every effort will be made to protect the participant's identity.

Declaration to participants

If you take part in the study, you have the right to:

- Refuse to answer any question
- Ask any further questions about the study that occurs to you during your participation.

If you have any questions or concerns about the research, please feel free to contact the researcher.

Tushar Bhageria

+91 9015116640

Tushar.bhageria96@gmail.com

I agree to participate in this study under the conditions set out in the Participant Information Sheet.

Signed:

Date:

Form Link - Google Form

APPENDIX D

INTERVIEW GUIDE

Project Title

Performance of "Digital India Programme" in the Rural Education sector In India – A Post-COVID Analysis

Purpose

The primary objective of this research study is to understand the impact of the Digital India program on the lives of students, teachers, parents, and other stakeholders residing in rural areas. With this research I would also like to understand the challenges and steps taken by other stakeholders including policymakers and entrepreneurs in the implementation of this program.

Role of participants

The researcher is requesting to interview you. This should take between 30 and 45 minutes and will take place at a convenient location to your availability. The interview will be recorded. You will be asked to give consent prior to the interview, and the interview will be confidential, and participants can withdraw from the interview at any point.

Collection of Information

The information collected will be used by the researcher to write his thesis as part of Doctoral degree. Only the researcher and his supervisor will be aware of documents and interview recordings. Anonymity and confidentiality are assured. The researcher will keep transcriptions of the recordings and will treat them with the strictest confidentiality. No participants will be identified in the thesis and every effort will be made to protect the participant's identity.

Declaration to participants

If you take part in the study, you have the right to:

- Refuse to answer any question, and to withdraw from the study at any time (including after the interview has been completed).
- Ask any further questions about the study that occurs to you during your participation.

If you have any questions or concerns about the research, please feel free to contact the researcher.

Tushar Bhageria

+91 9015116640

Tushar.bhageria96@gmail.com

I agree to participate in this study under the conditions set out in the Participant Information Sheet.

Signed:

Date:

APPENDIX E

SEMI STRUCTURED INTERVIEWS

Questions for Authorities (Teachers, Parents, NGO Leads, Anganwadi heads, etc.)

1. What type of school are you teaching in (Govt./ Pvt./NGO etc.)?
2. Please describe the classes you teach and how is the socio-economic background of students studying in your school.
3. Does your school have a ready infrastructure in terms of building, electricity, water, etc.?
4. Are students willing to come to school?
5. What additional benefits is the government providing to make students come to school?
6. Have you heard about the Digital India programme? If yes, how, and where?
7. Have you implemented any Digital practices in your school?
8. Is the government taking any measures in improving the current situation?
9. What support or training have you received in using digital technologies for teaching? Do you feel prepared to integrate these tools effectively?
10. What are your suggestions or recommendations to improve the effectiveness of the Digital India Programme in rural education? Are there any specific areas that require further attention or support?
11. How did students study during COVID?
12. How were exams held during COVID?

Questions from Online education platform provides

1. What are the challenges to digital education in rural India as per your business?
2. Do you have a plan in mind for implementing these services in rural India?
3. Do you get queries from people in rural India?
4. Do you plan to set up a physical coaching center in rural India as you doing in urban areas?
5. Do plan to collaborate with local communities, NGOs, or government agencies to enhance the effectiveness and reach of your online education programs in rural areas?

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