SOCIAL INTERNSHIP REPORT ON

ROLE OF TECHNOLOGY IN ENHANCING EDUCATION AMONG MIDDLE SCHOOL STUDENTS OF RURAL AREAS

(For 3rd semester B.Tech course requirement)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

JORHAT ENGINEERING COLLEGE

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ACKNOWLEDGEMENT

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend my sincere thanks to all of them. We are highly indebted to our teachers and seniors for their guidance and constant supervision. A heartfelt gratitude to Madam Aparna Barthakur, headmistress of Kakojan M.E. School who gave us the opportunity to conduct a study on the role of technology in enhancing education among middle schoolers. Also, we are highly thankful to Madam Riku Moni Sharma, assistant teacher of Kakojan M.E. School, for her able guidance and also for their support in completing the project. We are extremely indebted to Dr Diganta Baishya, HOD, Department of Computer Science and Engineering, Jorhat Engineering College for their valuable suggestions and constant support throughout my project tenure. We would also like to express our sincere thanks to all faculty and staff members of Department of Computer Science and Engineering, JEC for their support in completing this project on time. We also express gratitude towards our parents for their kind co-operation and encouragement which helped me in completion of this project. Our thanks and appreciations also go to our friends in developing the project and all the students of Kakojan M.E. School who have willingly helped us with their valuable input and cooperation.

ABOUT THE INTERNSHIP AND UNIVERSITY

Assam Science and Technology University (ASTU) was established on January 4th, 2010 by the Assam Science and Technology University Act of 2009 and notified by the Government of Assam via Letter No. ATE.222/2008/48. The university is located at Jalukbari, Guwahati.

Jorhat Engineering College is the second government engineering college of Assam. It has completed sixty years of relentless service to the society. ASTU has designed for the students of Bachelor of Technology (B.Tech) program, an enquiry based learning approach of Social Internship (SA1). The internship encourages students to take up scientific research on scientific issues of their choice in order to encourage young minds to examine and understand a situation.

Critically identifying problems and using them in practice, be socially responsive, innovative, understanding, have ethical values, promote teamwork, leadership skills and provide a sustainable solution.

THE SOCIAL INTERNSHIP

Social Internships are internships mainly done to understand a society's development and the problems faced by it in recent times. Social internships are the need of the hour as nowadays, students are only concentrated in academics and are very less aware of the society norms. As part of the social internship, we conducted a survey in the Kakojan M.E School in Kakojan, Jorhat of Assam. We approached a host organization, a non-government organisation named 'IDEAL Abhijan' and also in association with the headmistress Madam Aparna Barthakur of the school, carried out the study to make a report and propose solutions to the problems we observed. We had the opportunity to closely observe the various forms of interventions and interactions taking place in the school and successfully compile our observations and results into this report.

ABSTRACT

Given how quickly technology is developing nowadays, a high-quality education is crucial in the competitive society we live in. The use of technology in the classroom demonstrates a forward-thinking approach to education that helps kids achieve academic success, acquire higher conceptions, and improve their reading abilities, among other things. The conventional method of lecturing and taking notes has become ineffective in the modern environment. With the development of science and technology, it is now imperative that knowledge be thoroughly understood in order to be used correctly. Diversified teaching and learning modes must be taken into account in efforts to advance academia because they promote conceptual growth. In order to help students, understand the course material in a more effective and creative way, new teaching methodologies are being incorporated into the curriculum with the help of instructional material, 3D animated modules, and films. Students now view the adoption of technology in the classroom as an engaging and dynamic teaching strategy. All ages are given a framework and a variety of Smart Thinking Tools by the Smart Learning approach, which promotes deeper levels of learning and creative thinking. These days, both teachers and students are interested in technology. Students quickly pick up new ideas or technologies, which benefits them in the workplace. Smart technologies like cameras, projectors, and remote controls let students learn more actively and adapt to a variety of instructional formats. The idea of EdTech has not only made teaching more engaging, but it has also produced a fantastic platform for students to improve their performance. In addition, because visual notions make anything easier and clearer to understand for kids than verbal or written notes, it aids in their understanding of the topic faster.

Keywords: EdTech, technology, education

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INTRODUCTION

In the last few years, the EdTech (Education + Technology) industry in India has grown exponentially bringing a paradigm shift in the teaching and learning process. The changing trend has transformed the dynamics of education from classrooms to smart devices and created the need for virtual classrooms, online learning, video meetings and online proctoring using tech tools with artificial intelligence.

The Covid-19 pandemic situation has further accelerated this growth as virtual learning has become the new ways of learning. To mention, the University Grants Commission (UGC), a regulator that sets standards for institutions of higher education in India, has given approval to increase online learning component for 950 plus universities during the pandemic. The education industry is fueling the growth in virtual learning by implementing the plethora of opportunities offered by technology and innovation in the online space. The popularity and growth in the EdTech market has created new demands for various online learning platforms. India is home to the second-highest number of EduTech companies (327), followed by Brazil (275), the United Kingdom (245) and China (101).

The increased demand for tech-enabled learning solutions has given rise to EdTech start-ups operating in the country. India has the second-highest number of EdTech start-ups (4450) with Indian EdTech start-up company BYJU leading the way with the highest amount of venture capital raised. The Study Web of Active Learning for Young Aspiring Minds (SWAYAM) platform, a recently-launched Indian platform, offers Massive Online Open Courses (MOOCs) to help individual educators and higher education institutions to cater to the online demand. The present education system of "one size fits all" is expected to fade away gradually, to be replaced by a more personalized learning experience. This trend in online learning will continue to grow, and could never be reversed. In coming years, cohabiting with technology is the only way forward.

However, this development is limited to the upper quarters of the socio-economic stratum. Only 1 in 4 students in India has access to digital learning. The ratio is more in the rural areas. While mobile and internet penetration is taken for granted by those living in major cities of the country, many of the population is still only dreaming of uninterrupted connectivity. According to TRAI reports, more than 500 million people in India have access to only a 2G connection. Most people from this section belong to rural areas.

The Economist Intelligence Unit (EIU), in partnership with Meta, has released the Inclusive Internet Index 2021, where it has been shown that most students do not even have access to either the high-speed internet connectivity needed to access online learning or the digital devices with which to do so. There is lack of electricity, connectivity and relate paraphernalia and infrastructures in rural areas.

UNICEF estimates that fewer than 1 in 10 students in India have access to the internet-the second-lowest in the Southeast Asia region. On-ground data support this assertion-in August 2021, only 8% of rural students in India were found to have regularly attended online classes. It does not help that most educational content available online is not in the native vernacular used by the learners. Most rural students in India are neither fluent in nor familiar with English, the language of choice for a majority of online learning platforms while their competency in Hindi, the most commonly used 'Indian'

language, also cannot be taken as given. Not only does this raise a major barrier to the adoption of online learning in rural India but also impacts the quality of education delivered. In a country where less than 50% of households own a digital device and almost 75% don't have access to the internet, many parents, students and educators are extremely sceptical of online learning, which they consider to be less effective than offline learning. This scepticism is deeper in rural India where, in a 2015 study by the Socio-Economic Caste Census (SECC), 75% of the population sustained itself at less than INR 33 per day.

EdTech attempts to provide students with an engaging and comprehensive learning experience through digital platforms. However, it is impossible to succeed in this endeavour without considering the presence of a significant learning gap in the country. A wide array of digital and hardware solutions is being brought into the EdTech industry. Still, these products are not reaching many potential customers- that is, the students in rural areas of India who, arguably, need it more than their urban peers because of inadequate digital as well as internet penetration in rural and remote regions of India.

One approach to dealing with the issue of accessibility is for EdTech companies to work in tandem with institutions capable of providing the necessary support and infrastructure. These include state governments, schools and non-government organizations (NGOs). While this conjoining of hands requires patience, perseverance, and a realistic view of its long-term nature, it can help players adapt existing sources of knowledge-sharing and communication into an appropriate format that can support online education without the need for cutting-edge tools.

OBJECTIVES

The main objective of this social internship report is:

1. To study about the role of technology and EduTech companies in the education of students belonging to rural areas
2. To study the extent to which online education exists and is relevant among them
3. What problems do the students face while accessing online education?
4. To understand computer literacy levels and computer skills of students
5. To understand the accessibility of computers for students
6. Existing solutions and additional solutions that can be proposed and implemented

METHODOLOGY

The present study uses quantitative research design which employed survey methodology. This method was used to study the role of technology in the students of rural area, how effective it has been in imparting quality education and has it been accessible to them. This research is exploratory in nature and both quantitative and qualitative in orientation.

SOURCE OF DATA:

Data for the study have been collected through primary sources.

The primary data forming the basis of study have been collected from direct interaction with the students and teachers of Kakojan M.E.School, with the help of an interview schedule and an interactive session. The participants for this study were the students of class 6,7 and 8. The total number of students selected was 92 and all of them were taken in as respondents in this case study.

SAMPLE DESIGN:

The interview consisted of several questions and sub-questions, pertaining to the various aspects of this study. We also included a written questionnaire which was given to the students to answer. The study has included an interactive session also. Both the interview and the interactive session have been unstructured and unstandardized to make the conversation more spontaneous, natural and left open to the respondent. The students were briefed on the purpose of responding to the questions. They were asked to answer without fear or favor and were assured of the confidentiality of the information given. We also took photographs of our session and videotaped the interactive session, by due permission, to aid us in analyzing the answers given by the students more accurately and also to prepare the report afterwards. The teachers and the head mistress of the school were also interviewed. The sessions were completed in a way to ensure anonymity of the participants and increase the probability of honest response.

The questionnaire included the following questions:

1. Is it interesting for you to study with the help of moving images, just like you watch TV?
2. Have you ever heard of the term ‘computer’ and ‘mobile’?
3. If yes, have you touched computers and mobiles or used them?
4. During Covid, were you able to attend classes and where?
5. During classes, what kind of problems did you face?

6. Were you able to understand well during online classes?
7. Do you have computers in your home?
8. Do you have a computer lab or receive computer education at school?
9. Do you have electricity in your home at regular intervals?
10. Is there someone older to you in your house who could guide you as you manoeuvre your way through technology?
11. Do you want to learn how to use computers?

METHODS AND PROCEDURE OF DATA ANALYSIS:

Statistical tools like graphs, pie charts, tables and percentages were used to analyse the data collected.

LIMITATIONS OF DATA COLLECTION:

Students hesitate to talk about the details regarding their problems. Some are not clear about the present scenario that what may be bad for them even if they are dealing with the problem for years. Students were absent too at the time of the survey.

FINDINGS AND ANALYSIS

The responses from the participants, which form the main source of data were analysed. Statistics and percentages have been used to interpret and analyse the data generated through the interview and interactive sessions to arrive at a conclusion. The number of students in class 6,7 and 8 were:

Class 6: 25 students

Class 7: 38 students

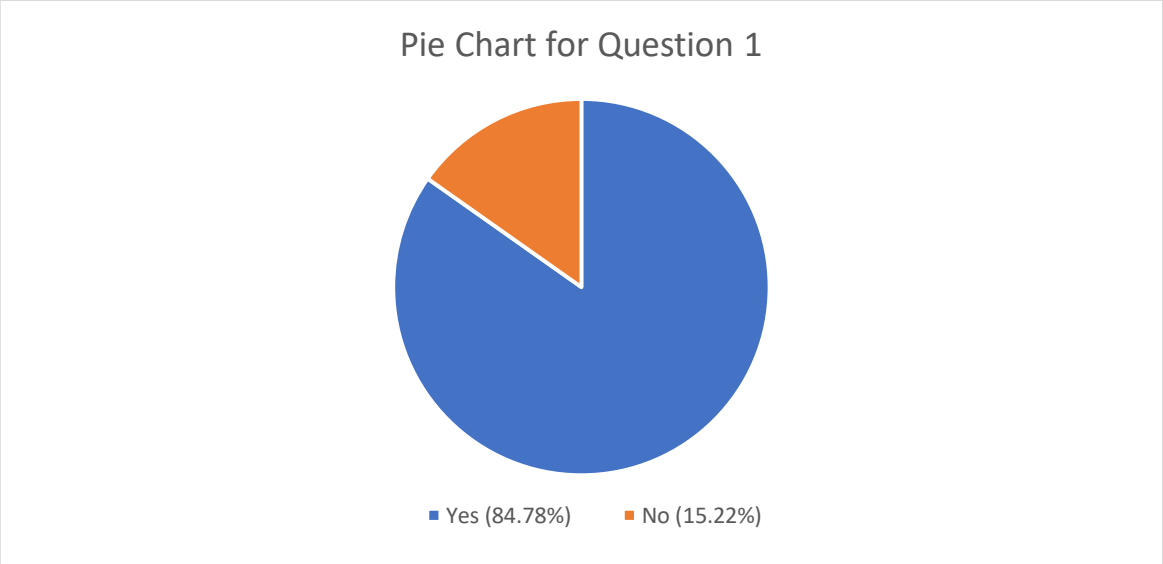
Class 8: 29 students

Total students: 92 students

The various findings respective to the aforementioned objectives have been listed below:

Question 1: Is it interesting for you to study with the help of moving images, just like you watch TV?

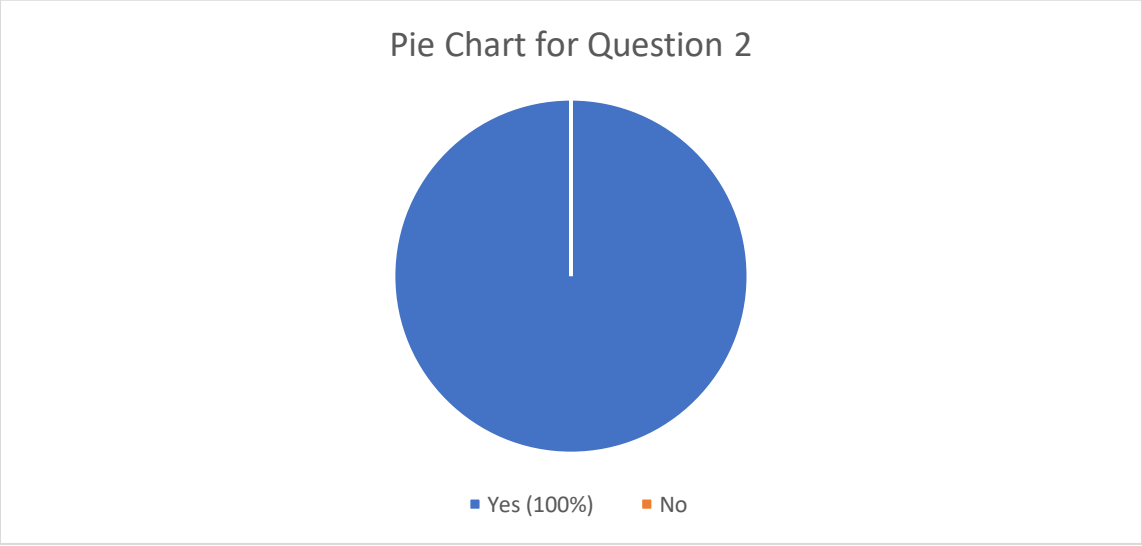
Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	20	80	5	20
Class 7	34	89.47	4	10.53
Class 8	24	82.75	5	17.35



We asked this question with the aim to learn whether the students were familiar with the preliminary stages of digital world like the television and if videos and animations, for example, in cartoons and movies, appealed more to them than the traditional text-books. Students were eager and enthusiastic when we described to them about the various ways videos could be used to learn as well. Majority of the students (84.78%) wished to learn through this means of education and put their foot into the world of digitalisation and technology. However, few of them were unable to relate to the question as they were unaware of the current world and also due to lack of communication and understanding.

Question 2: Have you ever heard of the term 'computer' and 'mobile'?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	25	100	0	0
Class 7	38	100	0	0
Class 8	29	100	0	0

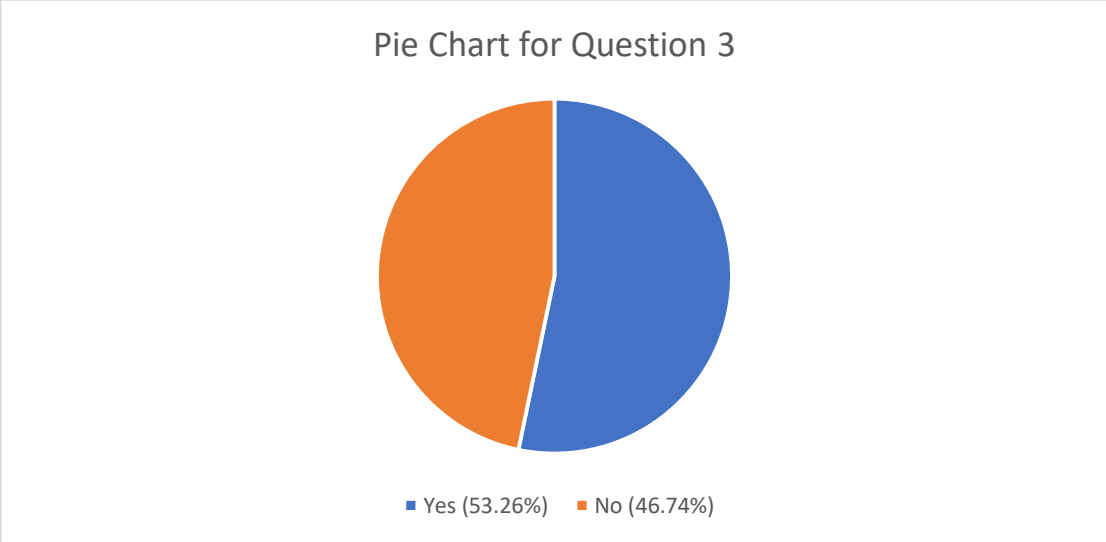


As we clearly know, that the first step towards change is awareness so, it becomes essential to find out whether the students are familiar with the terms 'mobile' and 'computer'. The answer was a 'yes' by all which clearly shows that students were very much aware of the existence of such devices.

Further discussion with them revealed that even though they had heard of these devices, some of the students had no knowledge of how mobiles and laptops looked like or what functions they could perform. A few of them were demented between computers, desktops and laptops, while a handful of them did not know that a device called 'laptop' even existed.

Question 3: If yes, have you touched computers and mobiles or used them?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	17	68	8	32
Class 7	20	52.63	18	47.37
Class 8	12	41.37	7	58.63



With the third question, we attempted to learn if the aforementioned devices were available to them. We received mixed responses. More than half of the total students had started using smartphones during the COVID pandemic. Access to smartphones became important for education during this pandemic which forced schooling to shift online. For almost a year, teachers took classes virtually and distributed reading materials over smartphones. Families did whatever they could to provide the students the necessities to ensure that learning continued during the lockdown. However, the other half

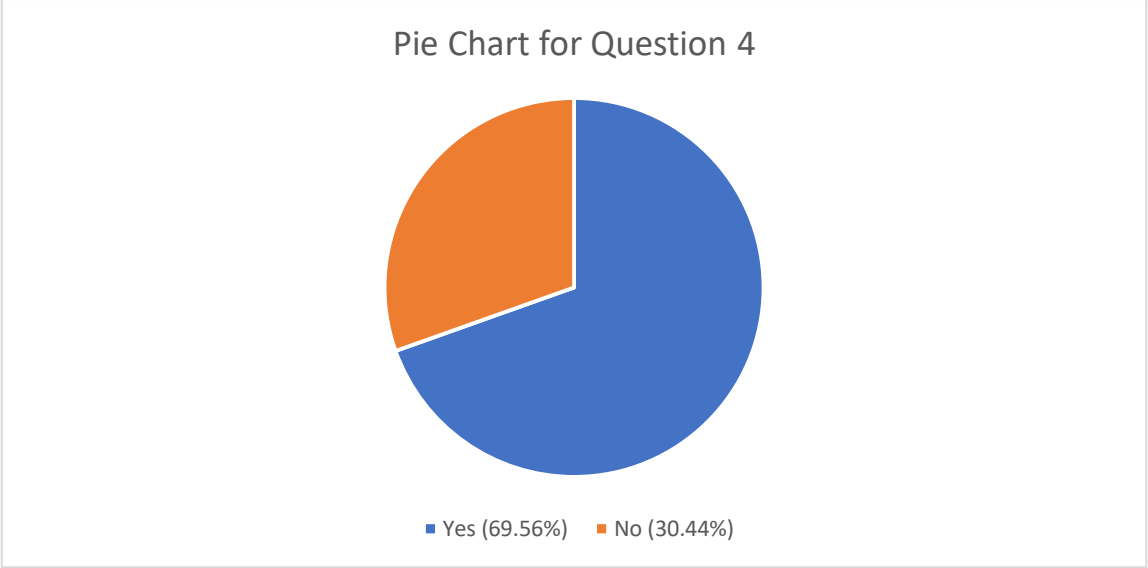
of the students did not have access to smartphones, owing to financial issues. Some of them had access to it occasionally.

We got a see a similar scenario with computers. Some of the students did have laptops at home, which belonged to their elder siblings or cousins. Further discussion suggested that those students who had no computers at home would find access to it at xerox shops and internet cafes. We asked them if they had used computers and half of them said they had. They shared experiences of having used Microsoft Paint, Microsoft Word, of having used the keyboard, of having played games and accessing the internet through it. They listened to songs, watched movies and music videos in Youtube. It revealed that they carried the knowledge and experience of the basic use of computers and when asked deeper, they were unaware of the advanced technological use of computers. This shows that these children were curious about the existing device and were keen to explore its uses and functions as far as they were able to or their knowledge allowed.

Students also knew about the internet search engine 'Google'. They knew what a document was, what a pdf was and how to open them and use them. Therefore, it was distinct that the students who used, tried to go as far as they could with their use of these devices and those who were ignorant or had no access to them, had no idea of what a mobile or a computer could do.

Question 4: During Covid, were you able to attend classes and where?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	15 All in mobiles	60	10	40
Class 7	29 All in mobiles	76.31	9	21.69
Class 8	20 All in mobiles	68.96	9	31.04



Since its breakdown in late December 2019, COVID-19 had wreaked havoc across the world and like any critical sector, education had been hit hard. Students, schools, colleges and universities have been deeply impacted. According to UNESCO, over 800 million learners from around the world had been affected, 1 in 5 learners could not attend school, 1 in 4 could not attend higher education classes and over 102 countries had ordered nationwide school closures while 11 had implemented localised school closure.

However, to cope with this crisis, the school organized online classes and put in efforts to make education effective and interesting. Though the classes were mainly conducted through 'WhatsApp' and 'Google Meet' but this one step towards preventing education to get affected during the pandemic ensured students continuous learning. Although this was a sudden and drastic shift in traditional education, students welcomed this change and those who were able to attend the classes did so with utmost focus and dedication. They interacted with the teachers, cleared their doubts, completed their home works and watched the videos and read the documents shared by their teachers to aid in their learning.

However, students who were unable to attend the online classes was due to the unavailability of smartphones and also no means of access to them. But we must mention here that there were students who did have smartphones available to them but even then, could not attend classes due to network woes and the like which is discussed in the next question.

Question 5: During classes, what kind of problems did you face?

Holding an open interaction with the students led us to certain discoveries:

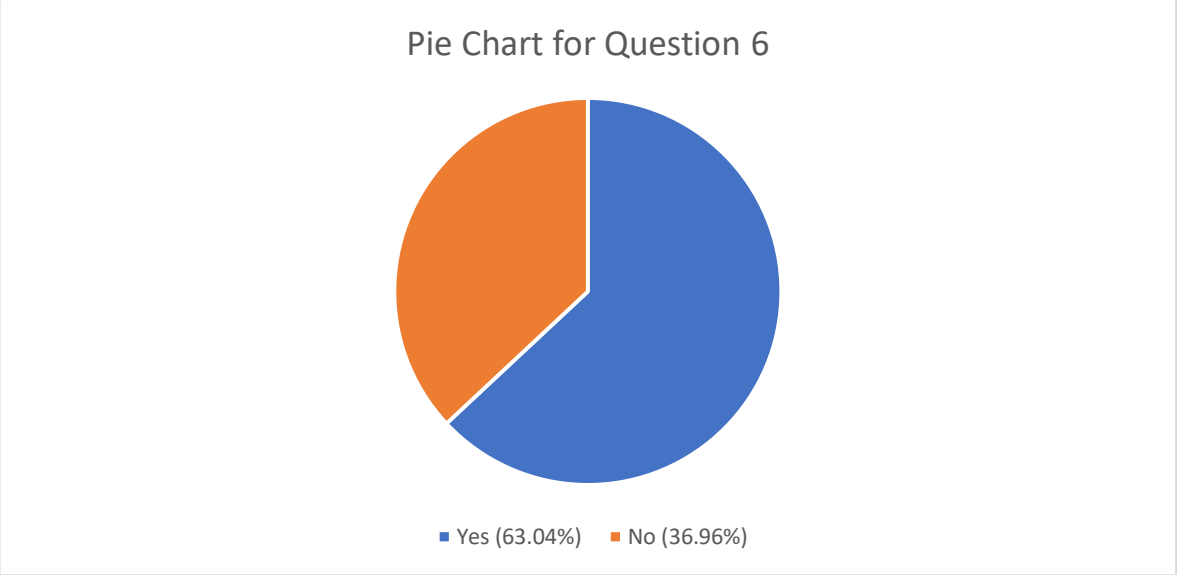
- Not every student had a personal gadget to use. Many of them shared their mobile devices with their parents and siblings to keep up with their remote work.
- The biggest problem faced by the students in online classes was a good internet connection, which is a pre-requisite for online learning. This hampered the growth of the students. Because without a stable internet connection, there was no means by which they could succeed in this online education setup. Moreover, students found it difficult to start from the same point where they left due to poor internet connection. An educator has very little control over these situations. Constant electricity supply was also another problem faced by them.
- Some students shared lacking the financial capacity to buy data packs repeatedly that would help them access online learning materials.
- There was the issue of English language dominating the Internet, which created a further divide between the students and the information they seeked.
- A class 7 student said that he did attend online classes but was unable to understand most of the course materials provided by the teachers. The students added that internet connectivity was the biggest obstacle that they faced. Similarly, a few of the students stated that though the teacher sent study materials through WhatsApp, it couldn't replace classroom education. Online education couldn't replace going to school. They expressed their difficulties on most occasions when downloading the documents and videos shared to them by their teacher became very difficult because of network woes.
- We are humans and interacting with each other is one of our basic needs. During classroom learning, students are able to have in-person interaction with their teacher and ask anything they wish to know about. However, such is not the case in online education. Students faced bad internet connectivity, interruptions and even the videos buffered. Sometimes phones shut down or the apps closed down themselves or there were moments when the internet was spotty and weak monitors made it challenging to keep up with their virtual classmates and learning environment.
- In a traditional classroom, teachers can monitor students and adjust their pace to accommodate anyone who needs extra time. In online learning environment, it became more difficult to do so. Since it was harder to read body language virtually, students stayed silent or could

not communicate well, leaving the class feeling discouraged, frustrated and having learned nothing.

- Students complained of lacking motivation due to a lack of interpersonal touch between the students and the teacher in the online classes. Students expressed their need of physical interaction which would have helped them in maintaining engagement. They also shared about getting distracted easily, due to which time management became more challenging. Having a time management system is perhaps the most difficult challenge for students to overcome because it depends entirely on self-motivation.
- Even though the new generation is very advanced and is proficient in using smart devices, but when it comes to learning, still many students are not able to adapt to the change in the education system. They still want to learn in a traditional classroom setup. Students lacked the digital literacy needed to operate while on online education which includes the ability to log in, participate successfully in classes, submit schoolwork and communicate with teachers and classmates. Students also lacked the understanding of online communication etiquette and their rights and responsibilities in an online learning environment.
- Students also shared that their parents were sceptical of allowing them to join online classes, mainly due to security reasons.

Question 6: Were you able to understand well during online classes?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	14	56	11	44
Class 7	27	71.05	11	28.95
Class 8	17	58.62	12	41.38

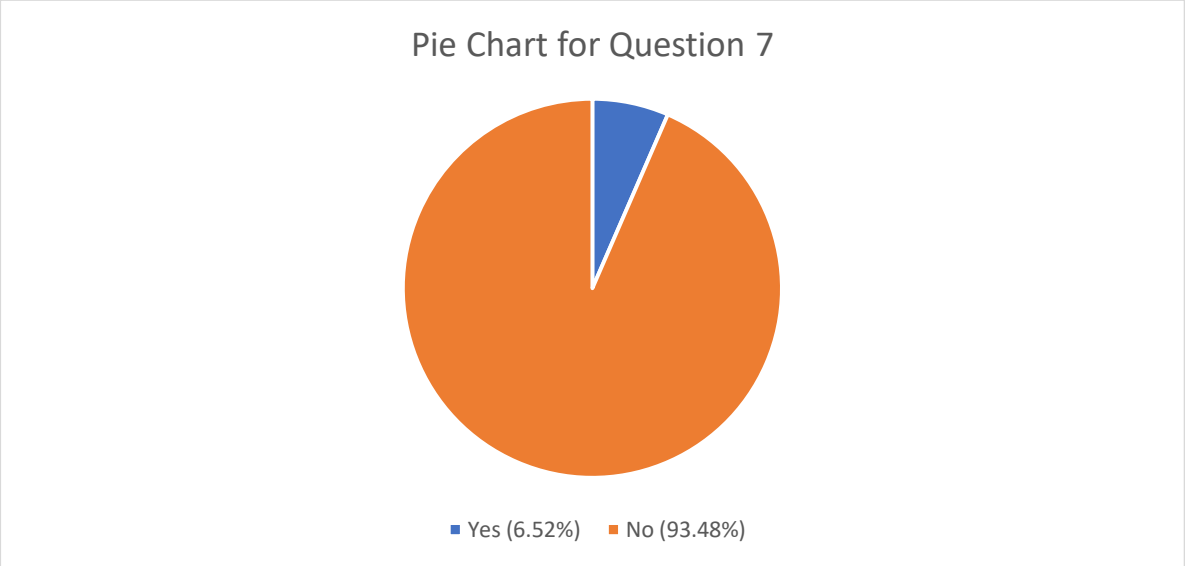


With this question, we aimed to learn if the students understood whatever was taught during their online classes and if they faced any difficulty in understanding the concepts lent to them. More than half of the students were able to understand what their teachers taught. They learnt in the same pace as they had in offline classes. According to them, each and every subject was dedicatedly taught by the teachers. Video lectures and documents shared to them by their teachers further aided in their learning and motivated them to give their best and cooperate with the educator in creating a successful and healthy virtual learning environment. In the brief discussion session with the students, they were elated to share their learnings from those classes and mentioned that how they learnt to read by themselves with the help of the YouTube channels suggested by their teachers and also go through the channels initiated by government. For these students, online education and access to hundreds of online resources proved to be a sea of knowledge to swim on and gather as much as they could.

Students who expressed difficulty in understanding the concepts mentioned the reasons as poor internet connectivity, wavering electricity supply and insufficient internet bandwidth. Some of them said that lack of in-person interaction with their teacher and physical classroom posed as an obstacle for them. It demotivated them and affected their urge in maintaining or even getting engaged along with the rest of the class. Few stayed silent even if they did not receive the explanation of the teachers well, pertaining to the lack in the teacher's part in paying attention to each and every student in virtual mode. However, we can confirm that it was practically impossible for the teacher to pay attention to every student. Thus, these students left the class feeling dejected.

Question 7: Do you have computers in your home?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	2	8	23	92
Class 7	4	10.52	34	89.48
Class 8	0	0	29	100



From the table and pie chart above, it is seen that almost all of the students did not have a computer at home. Further enquiry revealed that the students were eager to possess a computer and learn to use it but they could not mainly because of their family's financial status. Livelihood in a rural area is sustained depending on the income earned from their crops they produced, the groceries they sold or the labour work they did. For people of rural India, the sole purpose of their earning is to get a handful of rice, a shelter and some clothes to survive and in such grave circumstances, it becomes an impossibility to purchase a computer. In arduous times of survival, students have to dropout from schools as their parents or guardians can no longer afford the education. Government laptops presented to HSLC students or under any other scheme were also not received by them, either due to negligence on their part or on the part of the government.

Upon more enquiry, the students revealed that even though they did not have computers at home, yet they tried to access it wherever they could.

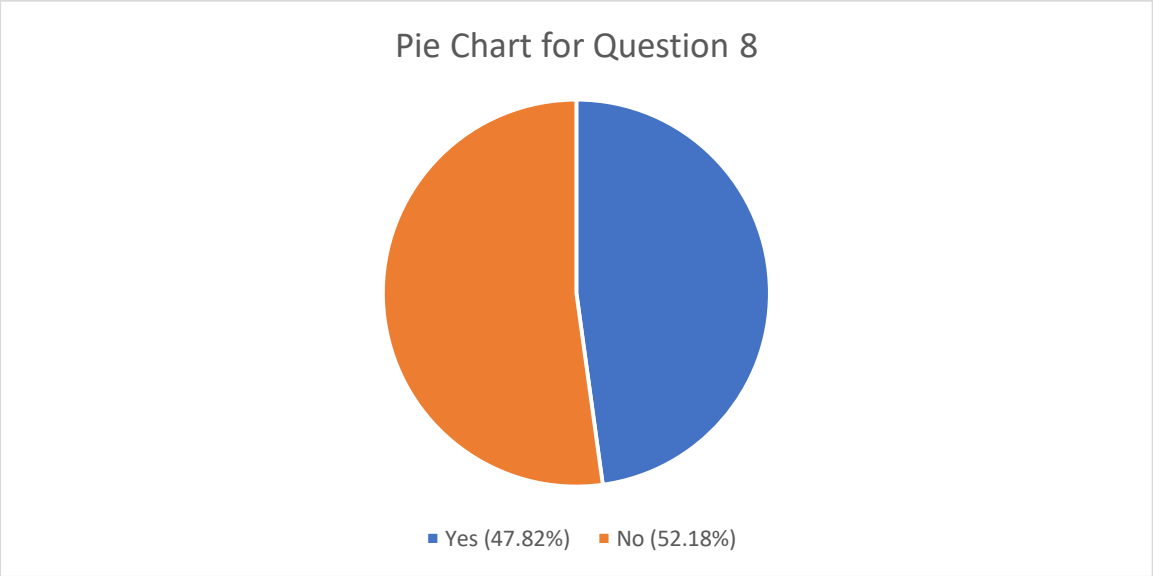
Students shared their experience of having used their desktops present in xerox shops and internet cafes. The handful of students who did have computers at home, the device belonged to their elder siblings or cousins and they could access it whenever they were allowed to.

Question 8: Do you have a computer lab or receive computer education at school?

Computer science has become an integral part of school education with e-learning, digital adaptive learning becoming the buzzwords. However, there are still several schools that are making a beginning in computer education. But such was not the case with Kakojan M.E.School. Further conversation with the students revealed that most of them sustained a positive attitude towards computer technology. During this period, we introduced a laptop to them and show them its basic functionality. We presented the device to the all the students and showed them some YouTube educational content, including an animated video of the solar system. They were taught this topic in class, however, many failed to answer simple, basic questions. After watching the video, each student was able to name the planets and state few characteristics of each planet, as taught in the video. Thus, these middle school students were avid learners and could explore the various computer applications with minimal assistance. Technology is prone to become an engaging entertainment toy for them and thus these young students would find working on computers a vicarious experience. Computer-based activities interest the students and could be instrumental in sharpening competencies in other academic areas. As the students answered the questions we asked relating to the 'solar system' video, it helped to reinforce the concepts taught, encouraged them and boosted their self-confidence. They requested us to teach them more and explore other educational videos available on the internet.

Question 9: Do you have electricity in your home at regular intervals?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	20	80	5	44
Class 7	10	26.31	28	28.95
Class 8	14	48.2	15	51.73



Online education and the digital world essentially require continuous, uninterrupted supply of electricity, so with this question, we aimed to learn about the electricity scenario in the houses of the students. In earlier times, although there were continuous disturbances in power supply, but they do not face such complications now. The **Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)**, an integrated scheme adopted by the Government of India, has ensured that all aspects of rural power distribution is covered and dealt with and provide undisputed power supply to the rural areas.

DDUGJY facilitates towards achievement of '24X7 Power For All' in the rural areas of India, through the following project components:

a. Separation of agriculture and non-agriculture feeders facilitating continuous quality power supply.
b. Strengthening consumers and adequate power supply to agricultural consumers
c. Micro-grid and Off-grid distribution network.
d. Metering of Distribution Transformers/Feeders/Consumers
e. Rural Electrification component (including the erstwhile RE projects)

However, this scheme also seemed not to have benefitted every student as seen from the pie chart above. Discontinuous, interrupting power supply is still a difficulty faced by half of the students, which is hindering them in achieving education online, while their fellow classmates progress day by day. The lack of access to energy greatly reduces the teaching resources and classroom materials. Videos and course materials shared by the teachers

cannot be accessed by these students, which are valuable methods for instruction. As a result, the students are unable to receive the quality of education they deserve. If their house does not have a source of energy, these students are not able to study at home in the evening. Students shared being forced to seek other sources outside their houses, sometimes under nearby street lamps, or in the light of the oil lamp and candles, in order to have enough light to complete their schoolwork. They often rely on kerosene lamps to provide light, a practice that is expensive, poses serious health risks and oftentimes cannot be found locally.

The lack of electricity also deters well-trained and well-educated teachers from living and working in communities that may need them the most.

Question 10: Is there someone in your house who could guide you as you manoeuvre through technology?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	0	0	25	100
Class 7	0	0	38	100
Class 8	0	0	29	100

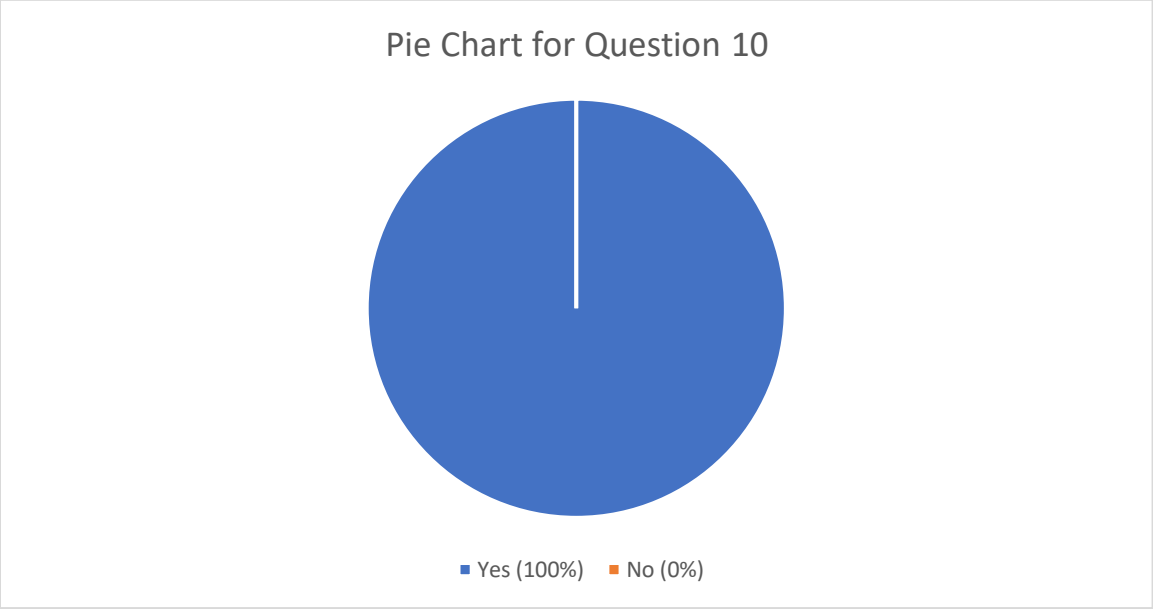
The students had no one in their home to guide them on the usage of technology. When technology integration in the classroom is seamless and

thoughtful, students not only become more engaged, they begin to take more control over their own learning. Effective tech integration changes classroom dynamics, encouraging student-centred project-based learning. When any teacher brings technology into the classroom, most of the students need a guide to help them use digital tools effectively for learning and collaboration. The capacity to integrate technology in the instructional process is not the same for every student. Students expressed having negligible familiarity and comfort with hardware and software. Without any guidance or help, the students struggled to work their way around using tech in their education and daily life. Proponents of technology in education often forget that students continue to use their mobile phones throughout the day, long after they have completed their school activities. With the daily dosage of social media and video games, the students shared getting accustomed to entertaining, intensive and short-term content that quickly stimulated their dopamine system. Without no supervision and control, students even used technology without limitations and restrictions, leaving behind the main purpose of learning and ending up on a website completely off-topic. Students failed to utilize the device time most efficiently. The daily interaction with technological devices has reduced their attention span. During online exams, the students could cheat and the teacher often did not know about it. The use of technology without guide and responsibility has led to a decrease in real life communication skills of the students. Students shared preferring spending time on their phones alone rather than spending time with their family and friends as such devices often appeal more to young and curious minds. Many of the students procrastinated too because it was effortless to drop their work, tasks and responsibilities for playing their favourite game, stick chats with friends or watch movies and series. To keep themselves from procrastinating, they needed sheer willpower, which everyone did not have. They spent a lot of time hooked onto their devices, reading posts on social networks or liking photos on Instagram. The time wasted could have been used productively instead, for studying, physical sports and exercise, meditations, spending time with their beloved ones, etc.

Access to technology without any control and restrictions also disrupts the privacy and security of the students. Although none of the students had been victims of cybercrime, we cannot say that they are protected. With the introduction of virtual learning, students have become completely dependent on technology.

Question 11: Do you want to learn how to use the computer?

Class	Yes	Percentage (%)	No	Percentage (%)
Class 6	25	100	0	0
Class 7	38	100	0	0
Class 8	29	100	0	0



Computer Science is one of the fastest-growing fields around the world. Technology has taken over the world and now in many activities, one involved themselves, we realize that technology has come into play. Around us, be it at home or at the workplace, we realize that a good number of things that we use using tend to have a technological component.

Keeping this in mind, we asked the students if they wished to learn how to operate a computer. Despite the fact that they did know how to operate a mobile phone and some of them had basic computer skills, they surely wanted to become proficient in the use of computers. The students participating in this survey provided detailed description of how and why they wished to learn about computers and where they first learned about them if they already possessed the basic skill set. They shared how capable

they felt using computers, their experiences with computers in and out of school and their expectations for future computer use.

Students frequently learn about computers from more experienced persons, starting at an early age. A similar situation was observed in this case. Students who were acquainted with a computer cited their cousins, elders, friends and neighbours who taught them. According to the students, one-on-one instruction with a more experienced person provided powerful and lasting learning experience. Some of the students also enjoyed learning about computer technology through independent exploration. They most preferred to learn about computers by simply trying to figure out by themselves, or with the support of a text or manual. One boy from class 8 said that he preferred learning alone because if he did not understand, he would not feel embarrassed or shy. Students generally expressed confidence in their ability to use computers, but there was evidence of gender differences in these beliefs. Both boys and girls rated their capacity for using computers as strong. They believed that they were capable of learning to use computers effectively and that it was meant for everyone. However, girls still seemed nervous and hesitant.

The effectiveness of computer technology experiences at school depends on the student's prior knowledge, the teacher, access to hardware and software and scheduling. For children who had no experience or knowledge in computers outside school, the school also lacked the infrastructure and means to provide them. The school had no computer labs, neither were the teachers digitally literate enough to teach them. Students struggled to take advantage of the tools, platforms, apps and resources available to their connected peers. This divide was not just in the school—there was also a lack of access to devices and broadband at home, as mentioned in an earlier discussion. This divide is pervasive and accentuates already destructive achievement gaps.

We made them think differently about what education is all about, not only books but also experimenting newer stuffs around you. This simple question to check a general eagerness of the students showed us that how much they are happy to receive this completely new thing. They asked how a computer actually works, what else can we do with the computer along with paint or type, how does a video works and many more. Curious brains accept changes and that's what they showed.

INTERACTION WITH THE TEACHERS:

We held a discussion with the teachers of the school, to get their views and opinions on the incorporation of technology, computers and online education to traditional classrooms. The teachers believed that their students were more adept at using technology than they were. It was very encouraging to see that all teachers of the school had embraced technology in their teaching profession and how it has become an integral part of their teaching techniques. When online classes were introduced, many teachers were concerned over the lack of training they received to allow them to deliver the curriculum virtually and they were provided with no training at all on how to teach through virtual mode. Their ability to use this technology was also hindered by the lack of knowledge.

We asked them what advantages they thought would the students have if they had computer skills. Teachers remarked that most of the students had the basic computer skills and were ambitious to learn more about its use and functions. According to them:

- Empowering kids with computer skills at a tender age gives them an upper hand in classwork as they are able to grasp concepts easily due to the fact that their mind have been challenged with things other kids of their level are doing.
- It helps them to be problem solvers. Critical thinking skills can be developed by teaching them computer skills. Students learn how to solve issues by looking at the bigger picture and then develop ways of how to break them down into smaller and more manageable ways. Out of the acquired skills, students can analyse different situations and be able to come up with solutions not just at their age but also when they grow up.
- Learning computer skills helps them learn and grasp concepts in class faster. Students find it easy to learn new concepts and with the help of computer skills, students can boost their ability to learn new things.
- Students are challenged to be creative and try to act according to the things they learnt through computer classes.
- When students have computer skills, they can visit educational sites on internet and be able to learn while at home.
- Students who learn important aspects of computer science will naturally find themselves at an advantage with increased career opportunities available to them as they get older. In this 21st century,

there is almost no job that exists that does not use some type of computer technology, and therefore it is advisable to ensure that the students have computer skills. According to the research conducted by **The Bureau of Labor Statistics**, jobs in the Computer and Information Technology field are projected to grow by 12 percent and account for 4.4 million jobs by 2024, which is a faster growth rate than average.

The teachers also expressed their wish to be able to provide the students with the infrastructure required to impart quality computer education to them. Most schools are constructing computer laboratories, and the new curriculum places a special emphasis on IT education from a tender age so as to ger students more acquainted with the digital age. Computers can be used to diversify, develop and improve the pedagogical relation of teaching and learning to enable the present generation of school children at all levels, appreciate the potentials of the computer; and to enable them to be able to use the computer in various works of life and later occupation. According to the teachers, computers can be used to evaluate student's performance and direct students with its patience, memory and endless capacity for details which defy competition from any ordinary teacher. They also produce significant time saving over conventional classroom instruction and allow students' control over the rate and sequence of their learning. Computers provide a more positive affective climate especially for slow learners. It provides appropriate record-keeping and thereby monitors students' progress as it puts more information in the hands of the teacher.

The classroom teacher will never be replaced by programme of self-instruction. Rather, the teachers told us that they will be freed to guide the learning of their students in ways that only a human being can. In using computer for instruction, they shall be freed from time-consuming chores as compiling, administering and marking tests, will have time to work individually with the subjects spending their time in leading group discussions and in working with students individually and in small groups.

The teachers' attitudes, beliefs and preferences will be changed and be adapted by this new teaching technique and experience. The objectives of computer education are not determined by students' needs, interests or hope alone. The students and the teachers would together decide what the students should learn and ascertain the students' goal can best be achieved.

We further discussed the various ways by which teachers could ensure quality education using computers and substantiate students found it convenient and functional. In accordance with the teachers, the computer as an entity is not totally independent. To achieve the set objectives of using computer for instruction, the teacher should check what each student is doing, and equally reconsider with the student the goals, methods, content, level and pace. Where a student with low ability tries a difficult material, it is imperative for the teacher to decide the possibilities of doing so. Teachers have the responsibility to help each student find the best way to learn, to help them with their work, to check their work and to guide them to more effective learning. They cannot be removed from effective instructional positions he or she occupies irrespective of the level of the technology because of the paramount role he or she plays in teaching and learning process.

As excellent and important the computer, it has not really gained its root in the school. This is because there are some challenges facing its implementations. The challenges of computer education are both educational and administrative. The prominent among the administrative problems is cost. Over the years, the cost of computer has been on the high side. This has been a deterrent to the adoption of computers for instructional purposes in the school. Coupled with this is the exorbitant price of software and hardware both. Where attempts are made to purchase computers, the costs of installation, maintenance and replacement are unavoidable. Further, facilities such as adequate air conditioning, an appropriate computer environment and buildings are unaffordable, keeping in mind the financial status of this school. Moreover, epileptic power supply and incessant power surge can cause damages to the computer systems.

RECOMMENDATION

"Education is what remains after one has forgotten what one has learned in school."-Albert Einstein.

While these words of Einstein may have been intended in good humour, they perfectly reflect the fact that effective education is, indeed, constant and always evolving. In fact, the face of education has adept a sea change over the decades. Once distinguished by the traditional classroom model, today, education has metamorphosed into learning that is prompt, online, self-driven and flexible.

Online education plays a crucial role in the current setting, where every student, especially in rural areas, doesn't have equal access to educational infrastructure. It levels the playing field for all students by providing them an equal and accessible platform to receive education. The knowledge of computer software or hardware in a basic necessity in today's world. By making students from underprivileged sections of the society computer literate will mean making them competent and better suited for today's job marker or pursue higher studies.

It was really unfortunate to see these well-deserving students not being able to use computers. Though we could encourage every student to get some basic computer knowledge to at least keep in touch, this is far from reality as the school did not have any computer lab facilities.

EXISTING SOLUTIONS:

Digital learning usually started long time back, although it flourished well during the outbreak of COVID-19. Some of the existing initiatives taken for students throughout the country includes:

- MHRD initiative of **DIKSHA (Digital Infrastructure for Knowledge Sharing)** was launched on September 5, 2017. Amidst the disruption of schooling due to COVID-19, DIKSHA made it possible for all states and Union Territories to enable learning and education at home through innovative state programs. DIKSHA is leapfrogging the use of technology for the benefit of teachers and learners across India. The national portal provides curriculum-based engaging learning materials to students, teachers and parents. Other initiatives also **include SWAYAM (Study Webs of Active Learning for Young Aspiring Minds)**, which offers an integrated platform for online

courses at affordable costs to all citizens, especially the underprivileged sections in the country.

- 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. NDEAR aims to offer distinct education ecosystem architecture for advancement of digital infrastructure in the country.
- Also, to reach out to those students who lack access to technology, various innovative activities are being done at national, state or district level such as **'Gali-Gali Sim-Sim'**, **'Tili-Mili programme'**, **'Motor Eskool'**, **'Roving Teacher'**, **'Project SMILE (Social Media Interface for Learning Engagement)'**, **'e-Kaksha'**, formation of WhatsApp and other social media groups, Work Book distribution at home, teacher calling to maintain connects with students.
- School Education is in the Concurrent List of the Constitution and the state governments have been directed to act based on the situation prevailing at every place to meet the demands of all students for providing them with the digital access required for learning digitally. Depending on the states' requirement, the Ministry of Education provides Rs. 6.40 lakh for setting up computer labs and Rs. 2.40 lakh for smart classrooms.
- National Institute of Open Learning – NIOS introduced activity-based learning for Classes 1 to 5 with the help of radio which became helpful for students in remote areas too.
- The role of NGO's has been significant as one of the NGO- PRATHAM in partnership with Vodafone Foundation of India has started a classroom initiative called "Learn, Out of Box" for the schools in rural areas.
- Social networking sites like WhatsApp also helps the children to be close to their teachers every time they need. YouTube channels has also contributed to millions for its varying contents by trained teachers through which they can get known to visualizing stories, poems and chapters of their textbooks.

For imparting computer education, the various existing efforts are:

- **The National Institute of Computer Education (N.I.C.E)** mission, which is a unit of National Account as well as Computer Education Trust registered under the Government of India, working in computer and accounts field with the central as well as state governments to

reach every class of society. The institute is committed to making computer education literacy available on very nominal fee structures across the country covering the rural and urban areas.

- **Indian Computer Education Society (ICES)** , which is a voluntary organization started in 1990.
- **All India Computer Saksharta Mission,** whose main motto is to bring computer revolution in every village and city of India by delivering the quality technical education at the nominal fee to the people of every category.

PROPOSED SOLUTIONS:

Government facilities often failed to reach every school as it is visible from our study, especially in rural areas. However, this digital divide can be bridged by innovating on delivery models for education and collaborating with stakeholders to come up with cost-effective solutions for prototypes to test at scale. The current, prevailing scenario requires effective governance to build quality infrastructure across the country, revamped education system to include digital literacy as a key component in learning, contemporary skills and capacity building of teachers to deliver online lessons and homegrown content in vernacular languages to reach the masses.

To bring computing access to the school system, we face several critical challenges. First, funding for computer labs is very limited, so revolutionary approaches to providing wide-scale access is needed. Second, electricity can be unreliable at times. So, an energy-efficient computing solution is required. We need a breakthrough solution that is ultra-low-cost, energy efficient and easy to deploy. Considering all the aspects, a shared computing solution would meet the performance requirements, cost less to purchase and use a fraction of the power.

The **NCOMPUTING** solution is based on a simple fact: today's PCs are so powerful that the vast majority of applications only use a small fraction of the computer's capacity. NComputing's virtualization software and hardware tap this unused capacity so that it can be simultaneously shared by multiple students. Each student's monitor, keyboard, and mouse connect to the shared PC through a small and very durable NComputing access device. The access device itself has no CPU, memory or moving parts—so it's rugged, durable and easy to deploy and maintain. By spreading out the cost of the shared computer, the school can provide up to four times the number

of stations for the same money. The NComputing devices use only 1 watt of electricity, so the entire 10-seat computing lab uses 90% less electricity compared to an all-PC lab.

The NComputing solution was applied by the Government of India to the school systems in Andhra Pradesh. 5000 schools and over 1.8 million students were enabled to have computer access. The government chose to use a BOOT model-build, own, operate, transfer-and engaged educational companies to build and equip the computer labs, hire and train teachers, operate the labs for 5 years and then transfer them to the government at the end of the contract period. NIIT, Educomp, Everonn, IEG and a number of other education system integrators were awarded the contract to build and operate labs. NComputing worked with local PC OEMs, including HP, Acer and HCL, to install the X-series kits in their factories and ship them to the required site. This teamwork approach resulted in most labs becoming operational within just a few months. After initial training to teach basic computer skills, students quickly moved to advanced courseware in math, science and social studies. This project was indeed the first big step in empowering the children of Andhra Pradesh to join the digital world.

Additionally,

- We the students can collaborate with an NGO, stakeholders or even our own college to provide the facility. For large scale installation, an appeal can be made to the government.
- Students can be provided with cheap multi-lingual platforms that could work on law bandwidth and provide access to quality content. The Government can also lower the price of data packs and offer tax benefits to the companies for providing online education in rural areas at a low cost.
- Some students do not have smartphones and internet access, owing to their family's financial instability. An innovative way would be to identify students who have a these provisions and have them clubbed with students who do not have access to any. This makes for an effective group study which makes great use of limited resources.
- The teachers can have pooled in money to ensure data recharges of the students' phones. This ensures that no one bears excessive cost and education is seamless.
- Our study among students reflects upon how interested they are to get on to the field of digital learning; as we made them see an educational

video regarding a topic of their syllabus. It was clearly visible that out of 38 students, the 28 students who were unable to understand the topic could visualize well, after this video. This shows the importance of physical placement of digital devices in a classroom, maybe devices in teacher's desk. To start with the digital platform, start with one in the classroom.

- Schools should be provided with digital learning kits and substitute sources of energy such as solar power should be installed as an alternative to the disrupted power supply.
- To incorporate computer education into the curriculum, study resources can be developed in the form of a teacher's handbook which can later be upgraded to a text book. Each level will address concepts, usage skills and social aspects. Each lesson will have a computer-based activity (educational games or applications), measurable learning outcomes and a lesson plan for the teachers. A list of projects can also be included to encourage collaborative learning along with guidelines for assessment. In addition, video modules can be provided to assist teachers in getting familiar with the applications or activities. Materials will be open source and available free of cost.
- Mere presence of computer isn't enough for there is a need of proper electricity supply to run. The school must ensure the availability of it because in rural areas, electricity becomes often the key factor for the deprival of the devices' uses.
- To get a hold of the newly developing technologies, it is recommended to organize workshops and have interactive sessions with the help of trained teachers, professors and even experienced students.
- Confidence of teacher with technology positively impacts confidence of students. This is in line with evidence from other studies that have highlighted the role of a teacher as a model that students emulate and transfer of positive computer attitude of the teacher onto her students. Hence, teacher training is an essential component of successful implementation of computer science curriculum.
- Awareness about technology is important amongst the parents and siblings of the students as it was clear that majority of them finds it difficult to explain the uses of technology or learning in devices in home because there is no one to guide and help them learn to atleast, complete their homework. It is always important that parents put their contributions in develop their interest and finds comfortable to discuss.

- Think of education in a completely new background so that students feel enjoyable to learn and the school sees a smaller number of dropouts. Most of the time the words and images of the books makes the classes a little less interesting and then digital boards will be helpful for they will develop newer ways to think and thereby, a step nearer to their progress.
- The ambitions of these school students need to be answered and hence, they must be exposed to the world of technology along with Right to Education. For a guidance to their career, making them talk with expertise like a famous personality or a professor or a student, be it in physical or virtual mode, will also help them grow efficiently and contribute to the development of the country.

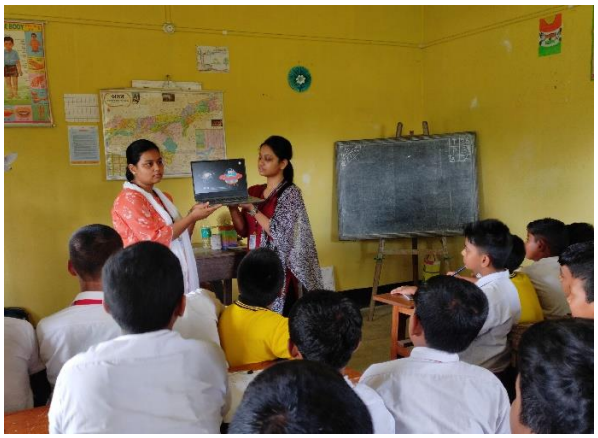
One limitation that compromises students' education, especially in the rural areas, is the lack of access of electricity. And its ramifications on education are tremendous. Lack of electricity can affect multiple educational parameters, such as attendance, dropout rates and learning outcomes. Electrification efforts thus have the capacity to transform the state of the students.

Access to electricity means that students can utilise technology. This does not mean only smartphones and computers; a device as simple as ceiling fan that provides ventilation on hot days can be the make-or-break decision that keeps a recalcitrant student in school. Outside the classroom, electricity can extend the studying time of students. Electricity and electrical appliances can also ensure certain household activities are done quickly, which can provide students more time to study. Cumulative benefits of electricity access tend to spill over into education—after all, a healthy and stress-free child makes for a better and more engaged student.

- The first priority should be improving the health of state-owned distribution companies (DISCOMs). They act as the final point of delivery for electricity distribution and will be pivotal in serving rural areas. Unfortunately, many of them have been chronically mismanaged for decades and have poor standards of operation and low rates of revenue collection. As such, many of them do not have the health or incentive to service rural areas—fixing DISCOMs would this benefit rural areas without the complicated task of installing new technologies.

- Renewable energy is the future of the energy sector. One application of it that will be pivotal to rural electrification is **Decentralised Renewable Energy (DRE).** DRE technologies like rooftop solar panels, micro- or mini-grids and rechargeable batteries are the ideal solutions to fill the gap. DRE can provide electricity to households that are not even connected to the grid, and could thus serve extremely to households of the students that may not be financially viable for DISCOMs. In those households and areas where electricity is available but power cuts are frequent, it can fill the gap during power cuts.

SITE VISIT



CONCLUSION

Since the advent of technology, the human race has benefited from time. Technology has significantly contributed to the development of our civilisation, from the invention of the wheel to the internet. During this time, technology was very important in the sphere of education, and the idea of the "Smart Classroom" emerged. A ground-breaking development in the realm of education is "e-learning." It is a well-known fact that everything new initially appears to be challenging before one becomes accustomed to it. When both the instructor and the students are accustomed to new technologies, exploring new things is the most pleasurable experience for both parties. Today's pupils have access to a variety of knowledge because to technology. Any sort of learner, whether gifted or impaired, may access and use the essential material to develop knowledge because information is nearly always available in every conceivable fashion. Teachers must equip students for a technology environment that demands independent learning, accuracy in procedures, and the capacity to recognise and evaluate data. To ensure that various social and psychological factors in children's development are taken into account while developing new technological approaches, research is necessary. As the pupils get more technically oriented, we must watch out that they do not lose the subtleties of interpersonal communication. The new approach to teaching and learning is a component of smart work since in today's world we all favour smart work than hard effort. In order to develop this idea further and make it a gift for future generations, we must all devote ourselves to smart ways of teaching and conduct more study in the area. This will make learning simpler and more engaging for students.

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