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An Investigation of Why India is Still Lacking to Use of EdTech in School Education

BY

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ABSTRACT

The field of education has seen a rapid invasion of technology. It has produced many benefits as well as a few drawbacks. This research will talk about how technology is influencing education in this section. The huge cost, the level of technological expertise needed to operate Smart Boards, and the Google and Android apps are starting to pose serious problems. Aside from that, the declining importance of writing and reading cannot in any way be justified for the healthy growth of the human mind. In the past five years, there has been a notable advancement in technology within the education sector. This study shows the full growth potential of EdTech, or educational technology, as well as the estimated eight-fold growth in the Indian education market in the near future. It is for this reason that many Edtech startups are already succeeding. The market for educational technology has expanded to a valuation of US$1.96 billion. Even with its huge popularity, EdTech still faces a lot of issues and difficulties.

The purpose of this research is to investigate the barriers to the use of EdTech (Educational Technology) in school education in India. Despite the growing availability of digital devices and technology, the adoption of EdTech in Indian schools is still limited. This proposal includes previous studies related to educational technology in India. The study will use a mixed-methods approach to collect information from educators, and students in education in various parts of India. This will include surveys, questionnaires, and teachers' preferences about educational technology. Furthermore, this research will discuss the methods how we collect data. The data collected will be analyzed to identify the most significant barriers to the use of EdTech in Indian schools and to recommend strategies to address these challenges. The findings of this study will be useful for policymakers, educators, and otherstakeholders who are interested in promoting the use of EdTech in school education in India.

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1. INTRODUCTION

Even though India has a succeeding EdTech industry, there are not many EdTech products that target or grow in low-income markets. A primary cause of this gap is the lack of awareness about the requirements and obstacles faced by end-users in low-income environments. Complete, ground-up data and trustworthy insights regarding the needs and behaviours of these users are lacking, and this is perhaps the most important area where tech-based learning is needed. As a result, a significant portion of learners' needs and goals have not been met by either policy or EdTech solutions. Over the last few decades, technology had a significant impact on Indian school education and made a huge contribution to the development of education. In the ensuing national education policies, the Indian government has placed a sufficient emphasis on education technology (ET) [1]. Edtech did not receive enough funding until 2019, but the Covid-19 pandemic sped up online education and gave rise to several EdTech start-ups in India and other countries. These Edtech businesses, which have been around for almost 20 years, offered a bright future for education. Millions of people who live in Asian nations are thought to benefit greatly from education as the single factor that most contributes to their prosperity. But for a very long time, the main delivery method remained largely unchanged. The education sector was slow in accepting and integrating the new-age technology, even though some institutions had begun to take advantage of it. The main idea behind the same was that, at least in the context of school education, the emergence of digital modes of instruction may result in the loss of several teaching positions. The goal of the current study is to map the current state and future prospects of EdTech start-ups in India. In a manner, the Covid-19 pandemic forced people everywhere to switch from traditional in-person instruction to online or virtual instruction. It was an important time that gave rise to numerous Edtech businesses that emphasized on the pandemic. The majority of terms (e.g., blended learning, m-learning, online learning, open learning, web-based learning, computer-mediated learning, etc.) refer to the ability to use a computer connected to a network, which provides the flexibility to learn from any location at any time using any method. The traditional institutions were unprepared to handle the digital challenges, even though the distance learning students had become used to virtual learning.

1.1. Journey of Indian Education

The history of the Indian educational system is complex and diverse, spanning thousands of years and reflecting the regional variations in culture, society, and politics. Here is a general timeline of its development:

- **Ancient Period:**
  - **Vedic Education**: The Vedas, the earliest Hindu scriptures, served as the primary foundation for education in ancient India. Young students, known as "Brahmacharis," would learn the Vedas in addition to topics like philosophy, mathematics, astronomy, and music while residing with their gurus(teachers) in ashrams [16]. The medium of language was Sanskrit during this ancient period.

https://www.quora.com/What-is-the-contribution-of-Vedic-education-in-ancient-India

  - **Gurukul System**: Under this system, pupils received one-on-one or small-group instruction while residing with their guru (teacher). The curriculum covered a range of topics as well as ethics, spiritual passages, and practical skills [16].

- **Medieval Period:**
  - **Islamic Education**: Madrasas (Islamic schools) were created to instruct students in religious studies, languages, and mathematics as soon as Islamic rule began to spread throughout parts of India. Additionally, these institutions helped shape Persian and Arabic literature. While Islamic education grew in popularity, traditional Indian educational systems like the Gurukul survived and continued spreading knowledge in a variety of fields [16].

https://www.indianetzone.com/39/education_medieval_india.htm

➢ Colonial Period:

- **British Influence:** The Indian educational system was substantially affected by British colonial authority.

https://www.jagranjosh.com/general-knowledge/gk-questions-and-answers-on-the-growth-of-modern-education-in-india-1525346483-1

- The British first concentrated on creating clerks and administrators to support the colonial administration. There were established English-medium schools and institutions because of the promotion of English as the preferred language of instruction [16].

➢ Post-Independence Period:

- **Education Reforms**: India underwent significant educational reforms after achieving independence in 1947. The government introduced policies aimed at increasing access to education, encouraging scientific and technical education, and eradicating illiteracy as well as forming numerous organisations to control education [16].

https://www.historyextra.com/period/modern/revising-the-raj-india/

- **The 10+2+3 system:** India established the 10+2+3 system in the 1960s, which calls for 10 years of primary and secondary education, followed by 2 years of higher secondary education and 3 years of university study [16].

- **Modern Era:**

The modern era of education in India has seen significant transformations driven by advancements in technology, changes in societal expectations, and efforts to improve access and quality of education across all levels. Technology integration, online education, qualitative improvement, and international collaborations are the key aspects of the modern era of education in India.

- **Higher Education:** A wide variety of courses are offered by universities and other institutions throughout India's extensive higher education system. Institutes like the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs) are globally recognized [16].

https://www.gstic.org/expert-story/how-covid-19-has-exposed-the-challenges-for-technology-in-education/

- **Technological Developments:** Advancements in technology have made education more accessible to a larger public by increasing the popularity of online and remote learning [16].

1.2. Background of Edtech in India

EdTech was not so popular in India before the COVID-19 pandemic (2020). Millions of people died during that time, yet most children and young adults were able to fight against the coronavirus. Due to the lockdown, the Indian government imposed, neither teachers nor students were permitted to attend colleges or universities. As a result, most schools and universities were eventually forced to include technology in their teaching methods.

The introduction and growth of EdTech (Educational Technology) in Indian school education is a relatively new phenomenon that has acquired substantial traction in the last few decades. Here's a brief background of EdTech in Indian school education:

- **Late 20th Century:**

  Some Indian schools began experimenting with computer-based learning and multimedia content as supplemental tools in the late 1990s and early 2000s. However, due to technological and infrastructure constraints, these projects were limited in scope and were not extensively implemented [17].

- **Early 2000s:**

  With the advancement of technology and the growing popularity of the internet, educational content started appearing online. Websites and platforms that provide digital resources, study materials, and online assessments began to gain popularity [17].

  E-learning platforms with interactive courses, video lectures, and practise examinations were popular in the mid-2000s. These platforms were designed to enhance traditional classroom instruction [17]. Some government agencies, such as MHRD(Ministry of Human Resource Development), and IGNOU(Indira Gandhi National Open University), made efforts to begin two-way video communication, however the initiatives did not provide the intended results due to insufficient technology advancements [17]. Schools began to use interactive whiteboards, allowing teachers to integrate digital content and multimedia tools during courses. This marked the beginning of a trend towards more dynamic and interesting classroom experiences.

- **2010s:**

  - **Mobile revolution:** In the 2010s, the growth of smartphones and low-cost data plans caused a huge change in the educational environment. Students around the country began to benefit from freely accessible instructional information via mobile apps and platforms.

  - **Government Initiatives:** To give free online courses and materials to students and teachers, the Government of India launched digital learning programs such as SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds) and DIKSHA (Digital Infrastructure for Knowledge Sharing) [17].

- **Present:**
  - The pandemic of COVID-19 has accelerated the implementation of EdTech in Indian education. Schools and educational institutions began using online platforms for remote learning, resulting in a growth in the usage of digital materials and tools [6]. To meet the increased demand for practical skills in the labor market, EdTech platforms are increasingly focusing on providing skill-based courses and vocational training. EdTech can bring quality education to underprivileged and rural sections of the country, thereby reducing the education gap [6].

While EdTech has improved Indian school education, difficulties such as unequal access to technology, quality control, and teacher training persist. The future of EdTech in Indian education seems promising as it evolves and adapts to the changing demands of students and educators.

1.3. Aims

The research aims to find out the usage of EdTech in schools in India and provide a recommendation to adopt technology in order to improve the learning experience which will be helpful for students and teachers. Moreover, this investigation will discuss problems and provide relevant solutions.

1.4. Objectives

- To recognize the most frequently used EdTech tools and resources in education [2].
- To understand the EdTech market in India.
- To give some solutions in order to adopt more and more EdTech in schools so students can perform well.

2. LITERATURE REVIEW

2.1. Edtech

Ed-Tech stands for "Education Technology". Students, staff members, and other users can further their education and receive training by using computers, computer programs, and educational systems [1]. The broad field of educational innovation includes not only the tools and software used in what is commonly referred to as "online training," "distance learning," or "remote learning," but also the theories of learning and expanding research into the most effective means of providing people with new knowledge and skills. CFI was one of the first businesses in the Ed-Tech sector and offers certification and training to current and aspiring global financial services professionals.

2.2. Growth of EdTech

In the words of [3], more than most people know, educational technology has a much longer history. One logical result of scientific and technological advancement is the use of computers in the classroom. Schools and preparation offices started using innovative technologies that were easily accessible around the middle of the 20th century, like copiers and media learning through recording. The 1960s noticed the introduction of computer technology into the classroom as a tool for teaching subjects like spelling and mathematics. It was projected that six million students would be enrolled in online courses in the US alone by 2010. Online education took off after widespread internet access became available. Overall, society has profited. Through increasing individualization, reason, objectivity (closing the income gap between high- and low-income groups), and transparency, ed-tech has advanced education. It is necessary to close the advanced separation and increase availability [5]. Ed-Tech is still in its early stages and has a lot of potential to produce innovations and results that will improve the lives of millions of people, according to Saurabh Deep Singla, CHRO at up Grad, the leading higher education technology firm in Asia.

2.3. Effect of EdTech in India on teachers and education style

The wave of educational technology brought several changes in the traditional approach of the education system and teachers. There are many changes that this technology made to systems and staff within India:

Firstly, it will initiate the next level of professional development in the teachers. By engaging with EdTech Many of the teachers in India mentioned that they also had professional growth. Engaging with continuous learning became important for teachers in India during the utilization of this technology. In order to adapt to the platform and new digital tools, teachers engaged themselves in training sessions. Currently, in India, there are several training sessions provided to teachers to improve their skills in utilizing educational technology to enhance the experience of students as well as provide personalized learning.

As per [3], there were several changes in the teaching strategies of the education system. Utilization of educational technology included multimedia and personalization within the system. The teachers started integrating with content such as stimulation games animations and videos of her projecting their lessons to the students. The level of creativity and innovation teachers increased by the implementation of this technology in the education system. Focusing on individual needs became easier with the utilization of this technology. supporting individual growth has become easier for teachers with this technology in India.

Educational technology was helpful for Indian teachers in developing international collaborations. The teachers in India have been communicating with global students about technology. There are several virtual conferences conducted by teachers in India to support students in different geographical regions. Collaborative projects not only with students but with universities have also increased in India after the implementation of this technology within the system.

One of the major problems in the Indian education system for teachers was getting feedback. With the implementation of this technology taking feedback on assessments and sharing the reviews became more easier for the teacher. The teachers have been utilizing online assessments with this technology which it easier to provide feedback. Quick feedback can be given to the students along with more information about this technology. Elaborating on their mistake and providing corrective measures in feedback has become easier in comparison to the traditional approach.

Along with this most of the teachers in India have mentioned that the engagement from students has increased after the utilization of educational technology. It is easier for students of all ages to understand the content and it has also increased with the quality of their understanding. Students are motivated by the assessment tools and stimulation facilities

provided by the technology to complete their learning [12].

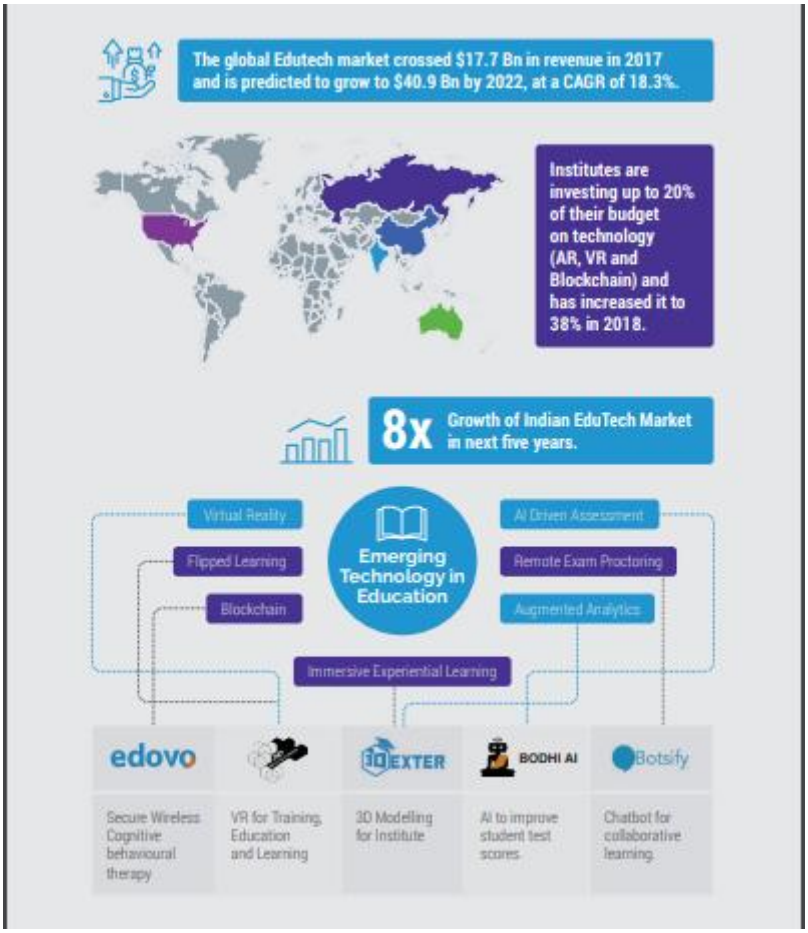
Along with this for teachers who are driven, decision-making has become more important in India after the utilization of this technology. This technology has provided tools to the teachers for evaluating the data more easily and communicating it simply. Who in hand the victims of their teaching strategies teachers utilize data-driven approach. Evaluating we are monitoring the engagement of students on their content helps them in understanding the problems. The feedback from students Helps in improving the material also.

2.4. Impact on the future of the Indian education system

This evaluation of the Indian education system during COVID-19 by implementing and adapting educational technology will bring several changes to the future of education in the country.

As per [6], there are several promising possibilities that have been generated by the implementation of educational technology in the current Indian system of education that will help in increasing the overall efficiency of India. Some of the main benefits that this development will provide to the future of Indian educational system are:

Increasing the scope and efficiency of remote learning - rural learning within India's future. It can be seen that most of the Indian students within rural or remote areas do not have access to efficient educational material. Implementation of this technology will create a bridge for students who want to study in rural and remote areas. In the traditional infrastructure of the education system in India, it was very costly for rural or remote area students to come and study in city or urban areas. This technology will provide online facilities to the broader population of India to improve their educational knowledge. This will help India improve its rate of literacy. With the support of the government and the development of efficient network systems within rural areas, the development of neurology can be more grateful to India in the coming future.



https://www.asmaindia.in/top-edutech/src/download/top-50-edutech-tools-in-higher-education-2019.pdf

Secondly, with more development and integration of machine learning as well as artificial intelligence within the system technology can be utilized in higher education also. For mastering complex concepts this technology can be utilized. India is known as a hub for doctors and engineers which is one of the most difficult sections of education. Understanding the theories and providing practical knowledge in healthcare education can become easier within Indian By utilizing this technology and including artificial intelligence with it.

According to [7], the future of India also holds a possibility of shifting to virtual reality for education. Around the world, there are several educational systems that have been considering the implementation of argumentative reality within healthcare education and other education systems. Implementation of virtual reality will be helpful in improving hard

learning within the healthcare sector especially. Practical knowledge will become easier and risk-free for India. In healthcare and engineering practical is very important for the students. Only having theoretical knowledge sometimes creates a barrier that can be removed through the implementation of virtual reality in the future. The environment of the educational system will improve more efficiently in terms of understanding complex practical knowledge.

2.5. Most frequently used EdTech tools

- **To Produce Engaging e-Learning Materials**

H5P: This open-source, free content collaboration tool is helpful for creating interactive videos. H5P can be used to add quizzes to videos.

Render Forest: Render Forest provides the best online branding tools to produce animated content quickly and with high quality.

Canva - Canva is a platform for graphic design that enables users to create various visual content such as documents, presentations, posters, and social media graphics. Through a drag-and-drop interface, users can edit the many professionally designed templates that they've selected, add their own photos, and modify the designs [13].

- **For learning Management-**

Edfly Learn: An LMS platform is called EdFly Learn. For the convenience of educators, it centralizes the organization of content.

Moodle: Developed in PHP and released under the GNU General Public License, Moodle is a free and open-source learning management system.

Course Networking: Course Networking (CN) is an international academic social networking platform that provides teachers, institutes, and students with next-generation LMS (learning management system) and ePortfolio tools.

Google Classroom: Google created this free online tool for educators with the goal of making assignment creation, distribution, and grading easier. Google Classroom's main goal is to make file sharing between instructors and students easier.

- **The Best Video Recording Software**

OBS Studio: Open Broadcaster Software (OBS) is a cross-platform streaming and recording application that is free and open-source. The program is now known as OBS Studio as of 2016. OBS Studio is available for Linux, macOS, and Microsoft Windows operating systems.

OpenShot: Available for Linux, macOS, and Windows, OpenShot Video Editor is an open-source, free video editor.

Audacity: Compatible with Windows, macOS, Linux, and other Unix-like operating systems, Audacity is a free and open-source digital audio editor and recording application software.

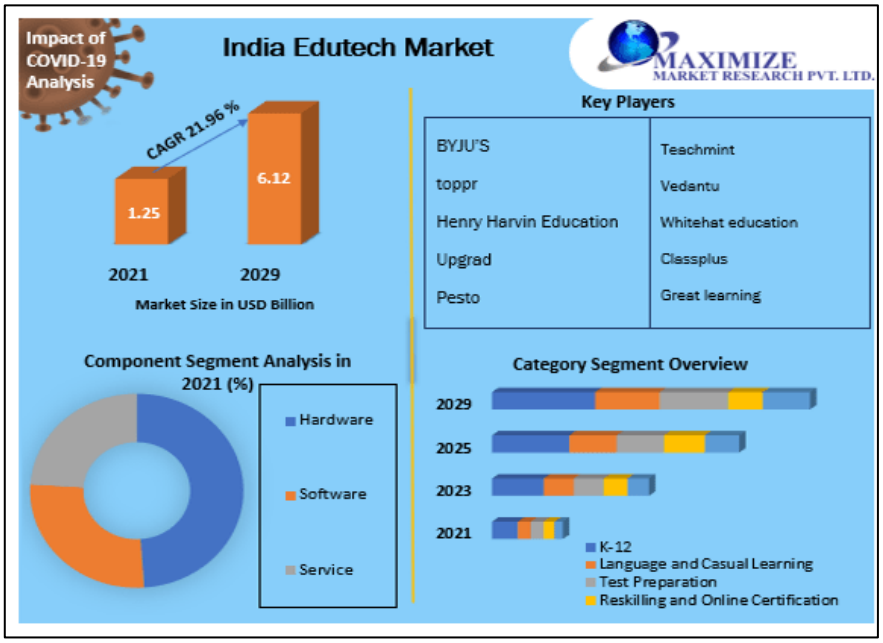
Tools for conducting Online Exam

Testmoz: It creates tests with automatic grading. Distribute via print or web. Examine and export the findings. Quizizz is a free, gamified quiz app that you can use at home or in class on any subject.

Kahoot: This platform for game-based learning is utilized in schools and other educational settings as instructional technology. User-generated multiple-choice tests known as "Kahoots" are available for access through a web browser or the Kahoot app. Exam.net: Exam.net is a safe digital exam platform [13].

2.6. EdTech Market

According to [8], with a dynamic market and ever-changing stakeholder base that includes vendors, technology platform providers, content creators, educators, students, and institutions acting as clients, investors, regulators, and governments, the Edtech market is becoming more and more complex. The Edtech industry is broad, with both large players such as Byju's and smaller start-ups making advancements in India. Every day, demand grows due to the accessibility of affordable internet connections with a competent bandwidth via digital platforms. These Edtech businesses are becoming more and more influential in the education sector's ever-expanding digital space, particularly in the wake of the COVID-19 pandemic. Governments and their oversight bodies have been waiting a long time to implement significant technological advancements in education technology to increase outreach and raise the gross enrollment ratio (GER) in colleges and universities. They seek to introduce analytical tools to assess the investment made in the education sector and revolutionize the teaching-learning process in the field.



https://www.maximizemarketresearch.com/market-report/india-edutech-market/53062/

2.7. Barriers to EdTech

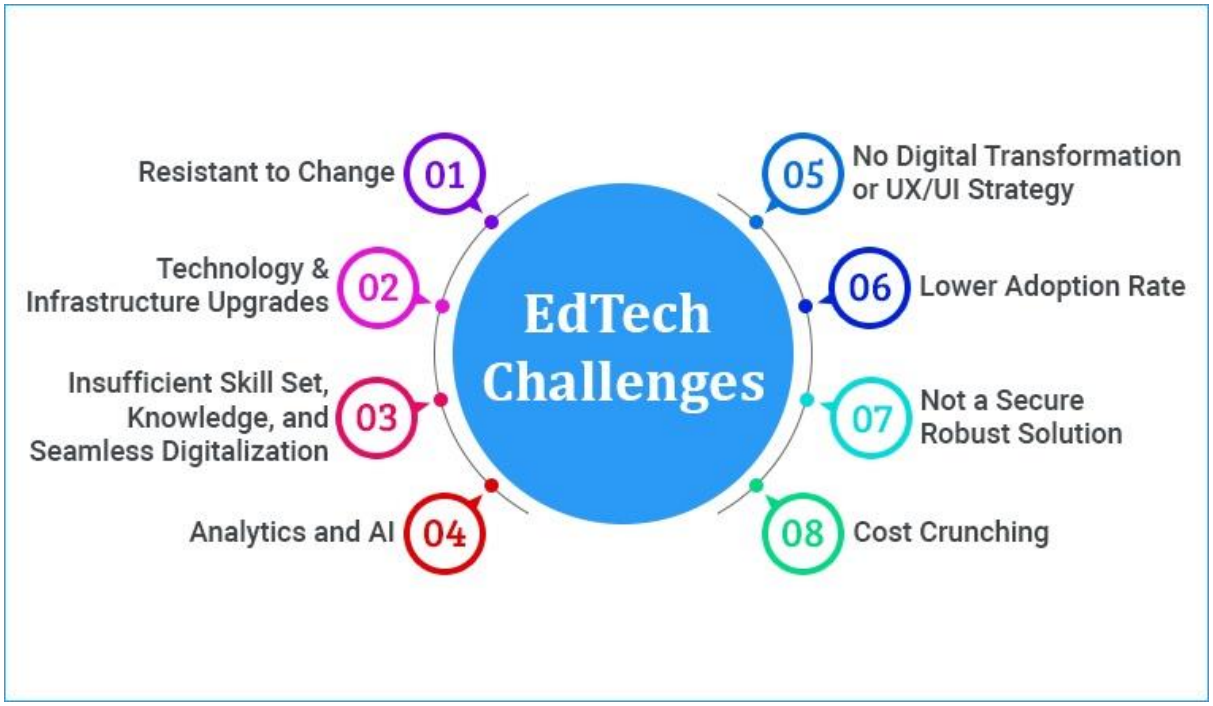
Resistant to Change

As per [9], leading education services experimented with various strategies to maintain their competitive edge. On the one hand, there is always potential for innovation and improvement in this field. The goal of the educational software development sector is to increase the enjoyment of online learning for educators and learners alike. The education industry has been slow to adopt cutting-edge services and technologies. While many administrators and instructors support Edtech, there are also many common obstacles and challenges in its way. Many institutions and schools prevent the use of technology because they do not see it as an essential component of learning.

Technology & Infrastructure Upgrades

EdTech solutions usually need a lot of bandwidth because they often need robust analytics and video buffering. For example, a staggering 95% of the complaints received from customers have to do with the user's internet speed, which is beyond our control. High-speed internet and a dependable device are necessary for an EdTech product to function, and India has not yet completely commercialized this combination for its sizable population. EdTech businesses can address this issue by implementing a feature only after the intended audience has access to it and gradually adjusting to the change. In India, technological infrastructure

is not very strong in all of the geographical regions. Geographically India has a huge diversity which does Not have a quality and availability of resources. There is very limited access to the Internet in most of the geographical areas within India. For online learning especially in rural areas, a reliable network is important. In rural areas, implementing educational technology is still a challenge for Indian schools. Along with this not all of the schools in India have the desired hardware and software for implementing the new technology. There is a lack of flexibility in the adaptation process of new technology within the educational system of India [15].



https://www.tatvasoft.com/outsourcing/2022/07/edtech-challenges.html

Insufficient Skill Set, Knowledge, and Seamless Digitalization

Professionals in the education sector are expected to be up to date on any technological advancements taking place in their disrupted environment. Early Edtech faced a number of difficulties, including inadequate technological knowledge and expertise, difficulty competing with other enterprises, and so on [8]. Hiring the right group of skilled resources is the only way to ensure that your team produces best-in-class results.

Price

Some of these technologies are extremely expensive and out of reach for smaller universities and schools. Some schools' BYOD (Bring Your Own Device) policies make matters worse by preventing teachers from providing their students with the necessary paperwork and information.

Insufficient Training

According to the words of [4], teachers' familiarity with all new educational technologies is greatly enhanced by tech training. Teachers have a steep learning curve when it comes to new technology because of the age gap between them and their students as well as the fact that the majority of them grew up with the same kind of technology that their students have access to and control over.

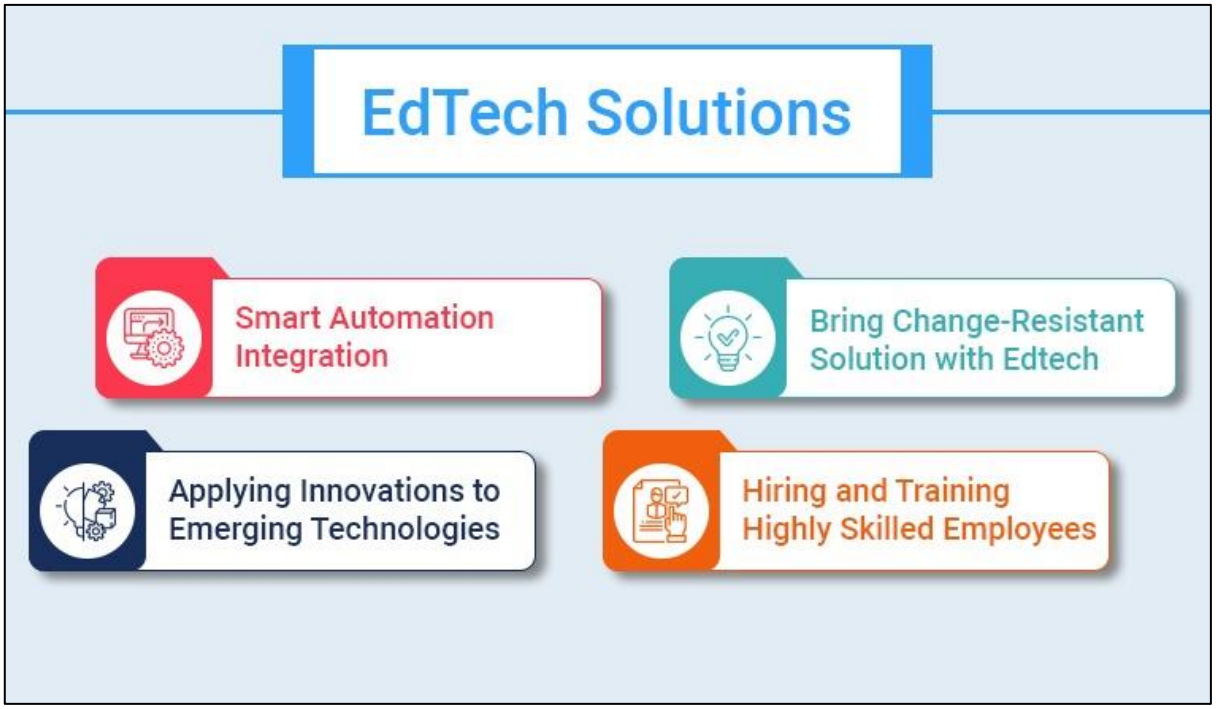
One of the major that the educational system of India has been facing the efficient implementation of this technology has been the skills of staff members. Not all of the teachers and professors in the education system of India have technology knowledge. The schools also do not have a proper structure of training for their employees to manage their skills in the changing environment. This became a huge barrier to the adaptation process. Training programs are essential and still, several professors have been teaching for more than 20-30 years but have to adjust to this technology.

Data privacy and security- With every tool of digitalization security and privacy have become one of the major concerns because of the increasing cybercrimes. In the Indian market for EdTech, this controversy has been a huge issue. There are several schools and universities were afraid of data breaches in their infrastructure at the time of deciding to implement educational technology. Schools often restrain the utilization of digital Tools on the premises to secure their information [14].

Difference between rural and urban areas- At one point in time urban areas in India could fully adopt the technology but it will be hard for the rural areas. Rural areas covered a sufficient amount of the Indian economy. A large number of the population in India lives within the rural areas with a backward condition. This is a huge barrier to the implementation of educational technology within the Indian infrastructure of education. The rural areas might not be able to fill the gap that their infrastructure of education has. Implementing technology

in rural Indian education has a long way to go.

2.8. Solutions to adopt more and more EdTech in Schools



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Smart Automation Integration

Automation is among the most inventive technological inventions. The majority of routine tasks have been made simpler, as has functional processing. Among the sectors that have not yet attained digital maturity is education. Regardless of the industry they operate in or the size of their company, over half of B2B companies use technology as part of their overall strategy [6]. Time constraints and financial barriers can be major hindrances to the modern educational institution. Automated systems can solve these issues entirely or in part. Automating a workflow has the potential to reduce long-term costs while simultaneously increasing productivity.

Applying Innovations to Emerging Technologies

As per [6], due to the ability of new technologies to adapt to it, the education sector is now relatively open. Teachers are willing to try out and accept a variety of new technologies that we have already seen a lot of. Additionally, you can make use of cloud computing, which is

a crucial pillar of digital transformation since it offers businesses improved cost savings, process efficiency, and mobility.

Hiring and Training Highly Skilled Employees

In the words of [2], businesses that participate in corporate learning should set up a program for employees to learn digitally and acquire new skills. They will be able to progress in their roles within the organization as a result, but they still have a way to go in terms of corporate change. It is very advantageous to invest in internal staff training and development. Additionally, having efficient communication within your company is beneficial as it guarantees accuracy in the educational processes and justifies your efforts.

2.9. Reasons for Adapting EdTech

The author states that while it can be significantly accepted that COVID-19 was the fuel to the adoption of education technology in India there are several other reasons also which contributed to this adaptation process-

Personalized development of Learning- After understanding educational technology schools and universities understood that it can be utilized for personalizing the experience of students for better learning. With this technology, all the students can be given individual support related to their characteristics. It is an adaptive learning platform according to the schools as it is helpful in adjusting the content on the basis of Students' performance in the classroom. It has provided more customization to the schools and has contributed to improving the results due to which the adaptation has increased.

Increasing flexibility- One of the major reasons for the increasing adaptation of educational technology in India is its flexible model of learning. For example, fully online courses have been benefiting the schools and not only improving the performance of students but the performance of revenue also. It can be seen that flexibility has been implemented but utilization of this technology in fulfilling the requirement of students. Along with this, the technology Allows a Beecher to individualize their approach [4].

Promotes collaborative learning- It can be seen that in India education system has been developing. Educational technology is introduced to the pathway of facilitating collaborative learning among the students. The digital tools provided support to students in completing

their assignments in group projects Regardless of their physical location. This has increased the scope of work remote learning in students around the world. For example, a student pursuing a course in business in Canada can complete their assignment through digital tools while staying In Singapore. It is helpful in fostering a sense of teamwork within student despite their Geographical presence. Not only do students collaborate with each other but the communication with the teacher and collaboration has improved through this technology and due to this it is being adopted in India speedily [15].

Cost saving and increased access- in India education is a priority for all households despite their income and social status. Whether middle-class or lower-class people everyone tries hard in India to provide the best educational environment for their children. The concept of educational technology has been helpful in India to support studies more efficiently despite their financial or household situation. Not only does the technology provides anywhere and everywhere accessibility to the students but it is also cost-effective in comparison to face-to-face classroom. Students had previously had to invest in university fees accommodations and daily expenses for completing a degree but with educational technology it has become easier to stay at home and complete the process.

Dynamic approach- As per [5], the education system in India has been going with the utilization of this technology. The student's parents and schools have been actively promoting the utilization of technology in the classroom because of its dynamic approach. Several interactive and engaging content are provided through digital tools which help in improving the quality of education in India. EdTech It’s becoming famous in India because of the solutions and results it has been providing to the people.

3. RESEARCH METHODOLOGY

3.1. Introduction

For completing this research paper, the mixed methodology has been selected. A mixed methodology is approved under which both qualitative as well as quantitative data is collected. It is a Research approach that provides benefits to the researcher by exploring both primary and secondary data collection methods. This approach is integrated with the aim of creating a comprehensive understanding of the researcher for the problem. This topic of research required evaluation of both numeric data and non-numerical data due to which of this method has been selected. Mixed methodology included the evaluation of both sequential data and numeric data.

The reason for selecting this method was that it created an understanding of complex research questions. The topic of this literature review was brought to Scooba, and evaluation required an understanding of statistical data and in-depth information. A mixed methodology helped create both. Along with the literature review was directly connected with the current situation of the real world due to which it was important to provide practically applicable information. Utilization of both quantitative and qualitative data is very important for providing proper information about solutions in interventions [14].

3.2. Research Design

A combination of a quantitative and qualitative research design will be employed to gather data from specific Indian schools. Several schools, the total number of teachers' preferences, and the number of technologies in use in classrooms will all be included in a quantitative approach. The data will be analyzed and presented using quantitative research methods. The reasons behind India's limited use of educational technology in schools will be investigated using a quantitative survey methodology.

A scientific approach to conducting experimental research with two sets of variables is achieved using experimental research design, which is an organized set of protocols and procedures. In this case, the first set of variables serves as a constant and is employed to calculate the second set's differences. Quantitative research is the best illustration of experimental research methodologies. A researcher can determine the facts of a research

study and make better research decisions by using experimental research to collect the data that is needed.

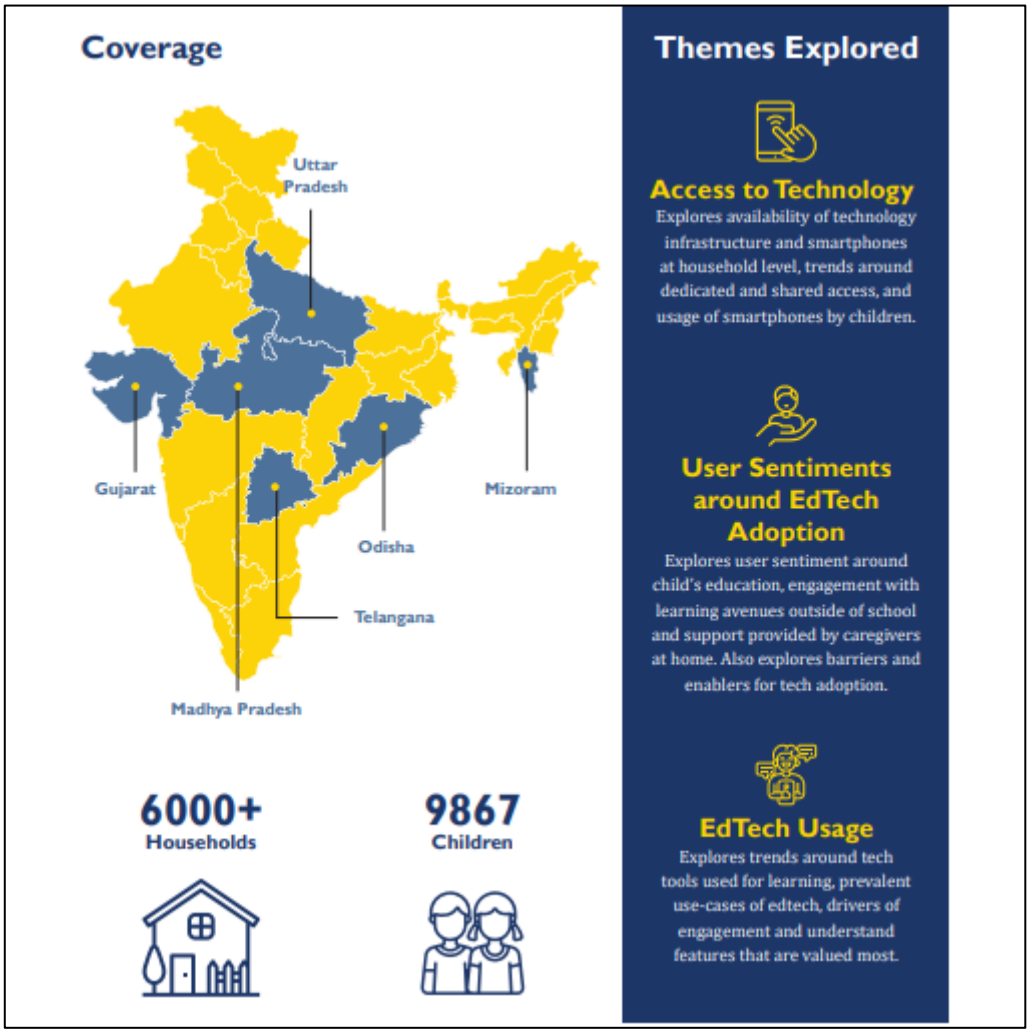
Before moving the research into clinical trials, experimental research enables you to test your hypothesis in a controlled setting. Additionally, it offers the most effective way to test your theory due to the following benefits:

- To get results, researchers have tight control over a variety of variables.
- The efficiency of experimental research is unaffected by the subject. It can be used by anyone for research.
- The outcomes are particular.
- Findings from studies from an identical dataset can be reused for related research ideas after results analysis.
- Scholars can pinpoint the hypothesis's cause and effect and then examine this relationship in more detail to derive deeper concepts.
- Research with experiments is a great place to start. The information gathered may serve as the basis for developing fresh research concepts for subsequent investigations.

3.3.Sample size

Although larger sample sizes are often desirable, the sample of 15 responses from the headteachers allows for in-depth qualitative analysis, enabling a nuanced exploration of the research questions. As a secondary data collection method, the second-most popular location in India, Maharashtra, will provide data for this study. The sample comprises both rural and urban schools from Maharashtra. This region was selected because it is the third largest state in India and is well-known throughout the world. The state has a reputation for offering students a cutting-edge education. Numerous well-known universities are available, including the University of Mumbai, the Tata Institute of Fundamental Research (TIFR), and the Indian Institute of Technology (IIT). Other participants involve teachers and educationalist from Gujarat, Odisha, and Telangana receive 20%, Madhya Pradesh receives 15%, and Uttar Pradesh receives 10%. The entire number of schools, teachers from particular schools, the facilities and technology that are currently available, and a random sample of Indian students will all be included in this study.

There are 66,750 government schools in Maharashtra, with 91% of them being in rural areas, 8% being in urban areas, and 1% being subcategorized as tribal. In this study, data from 1000 sample schools will be examined; 912 of these are located in rural areas, 77 in urban areas, and 11 are tribal schools. The survey will be the source of all data collection.



About Bharat Survey for Edtech 2023. https://www.edtechbase.centralsquarefoundation.org/wp-content/uploads/BaSE-Report-web-version.pdf

3.4. Data collection

In this research paper for collecting data both of the methods have been utilized. The primary data collection method can be defined as a process of collecting data by utilization of original resources. The information that has been collected firsthand and has not been published anywhere previously is considered information from primary resources. There are several

methods that can be utilized according to the requirement for completing the primary data collection process. In this research paper, a survey and observation method has been utilized to understand the problem. This method is helpful in answering the questions more efficiently.

On the other hand, the secondary data collection method can be defined as the process of collecting data that has been already published by someone else for different purposes. This process includes the utilization of information she's already available on online or offline platforms. For example- taking information from newspapers about the latest educational technology for literature review. Utilization of census data or government reports in literature. This method was helpful in understanding the insights related to the topic.

Survey Questionnaire

1. What best sums up your present situation in terms of using educational technology (EdTech)?

a) Current User: I actively use EdTech resources in my teaching endeavours.

b) Discontinued User: This person used EdTech in the past but has stopped using it.

c) Non-User: I have not included EdTech resources in any of my teaching activities.

2. Which is the most significant barriers to the successful integration of instructional technology in your school?

a. Resistance to Change

b. Upgrades to Technology and Infrastructure

c. Inadequate Knowledge, Skill Set, and Smooth Digitalization

d. Limited Funds

e. Inadequate Instruction

f. Security and Privacy of Data

3**. Which of the following EdTech tools are used by your school for various objectives?**

a. Render Forest

b. Canva

c. Edfly Learn

d. Moodle

e. Google Classroom for learning management.

4. How likely is it that your school will make future EdTech investments?

a. Very Likely

b. Unlikely

c. Neutral

5. Do you think the learning objectives and curriculum are met by the EdTech content available today?

a. Strongly Disagree

b. Strongly Agree

c Neutral

6. Has your school's faculty undergone formal training on incorporating technology into the classroom?

a. Yes, comprehensive training

b. No, no formal training

c. basic training

d. not applicable

7. How would you rank your school's overall tech setup in terms of incorporating EdTech?

a) Outstanding

b) Good

c) Average

d) Poor

8. How would you characterize your school's internet connectivity reliability?

a) Extremely Reliable

b) Reliable

c) Unreliable

d) Lack of Internet access

9. How do you imagine integrating educational technology in schools to benefit society in the long run?

a) Specifically raising student engagement and learning outcomes.

b) Improving the effectiveness of educators and supporting individualized instruction.

c) Promoting cooperation and dialogue between teachers and students.

d) Simplifying administrative work and raising the general effectiveness of education.

e) All of the above

f) None of the above

10. How would you characterize your current attitude toward your educational institution's adoption of educational technology?

a) Very good; considerable advantages are observed.

b) Mostly favourable, though there are some concerns.

c) Neutral, having neither a favourable nor a negative attitude.

4. WEBSITE DESIGN AND IMPLEMENTATION

4.1. Programming Language Used

The website has been designed using PHP programming language with Laravel framework. The web application framework Laravel features a beautiful, expressive syntax. A web framework gives you a plan and a place to start when developing your application, so you can concentrate on making something truly amazing while we worry about the little things. With robust features like comprehensive dependency injection, an expressive database abstraction layer, queues, scheduled jobs, unit and integration testing, and more, Laravel aims to deliver an incredible developer experience. One has access to a wide range of tools and frameworks when developing a web application. On the other hand, Laravel is the best option for creating cutting-edge, full-stack web applications.

The web application School Management System was created using Laravel. This system helps to keep track of data about educators, learners, and other elements. This kind of system can be used by schools, colleges, and universities to organize their information. A software program called a school management system is made to make different administrative duties in schools more efficient. Numerous tasks, including student enrolment, course scheduling, fee administration, library management, attendance tracking, and more, can be automated with this system.

Agile methodology

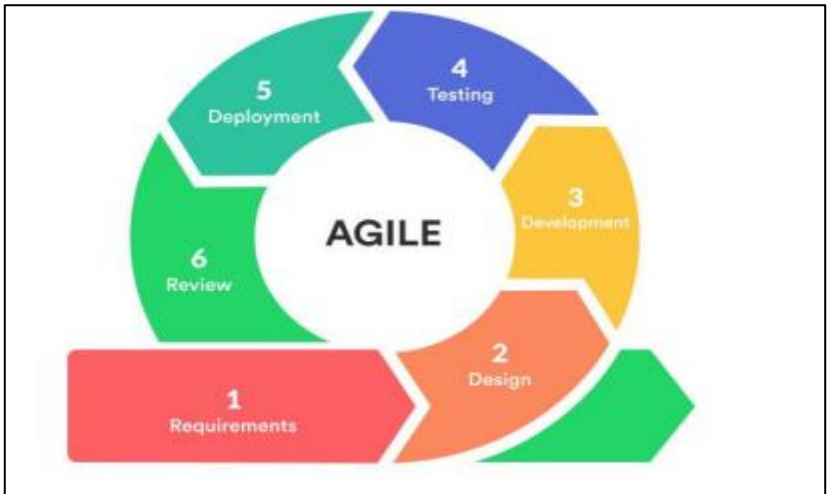


Figure 1. Agile Methodology in System Development

(Source: Adapted from [10])

The SDLC has proven to be the most dependable approach to software development over time. But more and more, modern Agile techniques are taking the place of more conventional ones. Agile methodology aims to increase customer value by shortening development cycles and implementing frequent changes. The agile technique, as shown in above figure, is a great fit for producing software quickly and efficiently because of its early delivery, flexibility in the life cycle, and adaptive nature.

4.2. Requirements

Processes and procedures in schools necessitate careful consideration of big data. Although there are many ways to collect data and gather requirements, the study's proponents chose to use two (2) methods. The first method is interviewing key informants or people with in-depth knowledge of office transactions; this allows the supporters to ask open-ended questions, which is helpful when designing the user interface (UI) and data processes. Forms and reports were collected using the second method, which involved gathering data documents like grade slips, enrolment forms, curriculum, assessment forms, registration forms, and school reports.

4.3. Design

The collected forms and reports are analyzed to create a functional design of the network infrastructure, which serves as a framework for defining the physical components of a network as well as their functional organization and configuration. Other components of the network architecture include the user roles that define permissions for users to carry out specific tasks, the database model that establishes the logical structure of a database, and the system architecture, which is the theoretical framework that defines the framework, conducts and more views of a system [10].

4.4. Development

Because the system is made up of two development environments, it is a hybrid form of development. There are two types of environments: a web-based platform and PHP Laravel. The Java platform serves as the transactional program, enabling users to carry out real-time school-based tasks like subject control, registration, examination, and report printing. Meanwhile, the Web-Based System facilitates interaction between various user roles and the

system through summative reports like class lists, student grades, grade evaluations, and faculty grade input.

The user's privileges are identified and verified by the system. The Super Admin (System Administrator), the Staff (School Registrar, Admin Assistant, Program Heads), and the instructors are the three different categories of users. The super admin is in charge of overseeing all system operations, including default system settings and user(Admin, Teacher, Accountant, student, Librarian) records management. In addition to controlling assessment, generating reports, adding entities like rooms, instructors, subjects, sections, and user profiles, and changing entity details like school default settings, the super admin can also enroll students [10].

The school registrar is limited to producing reports on student grades; in addition, TOR has the ability to manually alter student IDs, drop students, and adjust staff privilege levels as needed. In addition to creating the COR and student assessment, the administrative assistant submits scholarship applications when appropriate. Additionally, the administrative assistant is capable of producing administrative assistant reports, including grade slips, subject-enrolled student summaries, student assessment summary reports, and lists of payee and non-payee students. In addition to adding subjects, sections, and instructors, the program head can also enroll students and create student lists broken down by course, department, and year level. The only ways the instructor can upload their grades to the system are manually or by using the (.xls) file upload format that the system offers.

It is essential to imagine the layout, style, and functionality of any website or mobile application before starting to develop it. Moreover, how users will engage with every page and symbol, in addition to the overall performance of the website/application (behaviour, load time, etc.). Requirements are the qualities a system must have to be valuable and useful to its users. They are a statement of a capability, feature, or quality element. Developers can start working on additional technical tasks, such as system planning, creation, evaluation, implementation, and operation, provided the requirements have been established. Each device has both functional and non-functional requirements, which must be considered into account when figuring out what the system needs. Functional needs are user-visible features like "create a report," "login," and "signup" which are usually started by system stakeholders. However, nonfunctional requirements such as security, dependability, and maintainability describe how the system will carry out its intended functions.

4.5 Functional Need

a. Admin: Make, modify, and remove user(Teacher, Parent,Student) account.

- Share news with users (parents, teachers, and students).
- Student grades may be stored, edited, deleted, calculated, and printed.
- Add the professors' classes and subjects.
- Modify the user's details.
- Look for a student's grade by ID and name.
- Make, modify, remove, and print a schedule.

b. Teacher: Enter the student's grade for each topic.

- Add the attendance of each student by subject. Make contact between the parent and student.
- Post news for users (parent, student, and administrator).
- Include inquiries in the Questions Bank.
- Transfer the Activity to an Additional Teacher.
- Include Activity for Admin.

c. Learners: View their grades by subject.

- Ask the administrator and their teacher.
- Examine the Question Bank by subject.
- Post updates for educators, parents, and administrators.
- Modify the details of their account.

d. Parents: View their children's marks.

- Examine the children's attendance.
- Post updates for users (Admin, Teacher, and Student).
- Modify the details of their account.

4.6 Non-Functional Need

a. Security - Only authorized users with a username and password may access the system, which contains accounts for each user. The PHP function '**hash()**' (encrypts the passwords).

b. Performance- Records may be easily tracked and updated.
c. Accessibility - Users only need a PC and an Internet connection to use the system from anywhere at any time. Additionally, the system functions with a variety of web browsers, including Internet Explorer, Mozilla, Opera, and Chrome.
d. Easy to Use- The system is very interactive and has a user-friendly interface.

4.7 Testing and Evaluation

After designing the website, it will be given to Indian schools and universities to be used. A survey will be then conducted to know how well the schools are getting benefited with this technology. An analysis of the survey will be given below in the analysis section. The teaching and administrative staff of the schools and universities participated in the study as respondents. Their selection as respondents stemmed from their participation in the school information management process. Instructors of each respondent as well as the registrar and administrative staff were present. of whom the school management information system is a direct user [11].

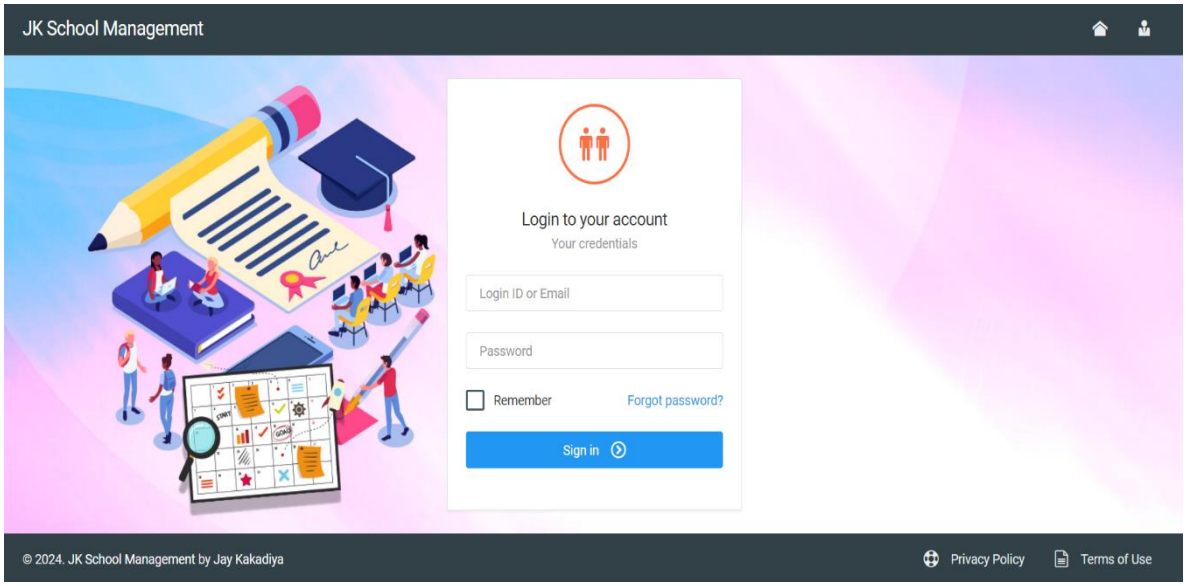
The technique of purposive sampling was employed by the researchers. When working with a small target population of subjects, it was utilized to choose the individuals who best fit the study based on personal judgment. Every respondent was tested separately at a time that worked best for them. Regarding functionality suitability, usability, and reliability, the researchers employed ISO/IEC 25010:2011, which displays the elements of the assessment questionnaire.

The IT department remotely updates and upgrades the system to guarantee that any issues or problems that develop with continuous use are promptly resolved. Data restores and backups are already included to prevent data loss in the event that a hardware device malfunctions.

4.8 User Interfaces

Figure 1 depicts the login page in which login IDs and passwords are required to enter the dashboard of the school management system by clicking on the sign-in option. The footer of the webpage includes copyrights, policy privacy, and terms and conditions. Users can read the privacy policy and terms and conditions by clicking on those options.

Figure 1: Login Page



When the user tries to log in, the system will check the identity by matching the ID and password. If the information does not match then it throws the error otherwise user moves to the dashboard. When the user inserts the correct information and matches the credential, the system checks the user type which could be super admin, admin, teacher, accountant, parent, or student, and moves to their home page or dashboard.

Figure 2: User Dashboard

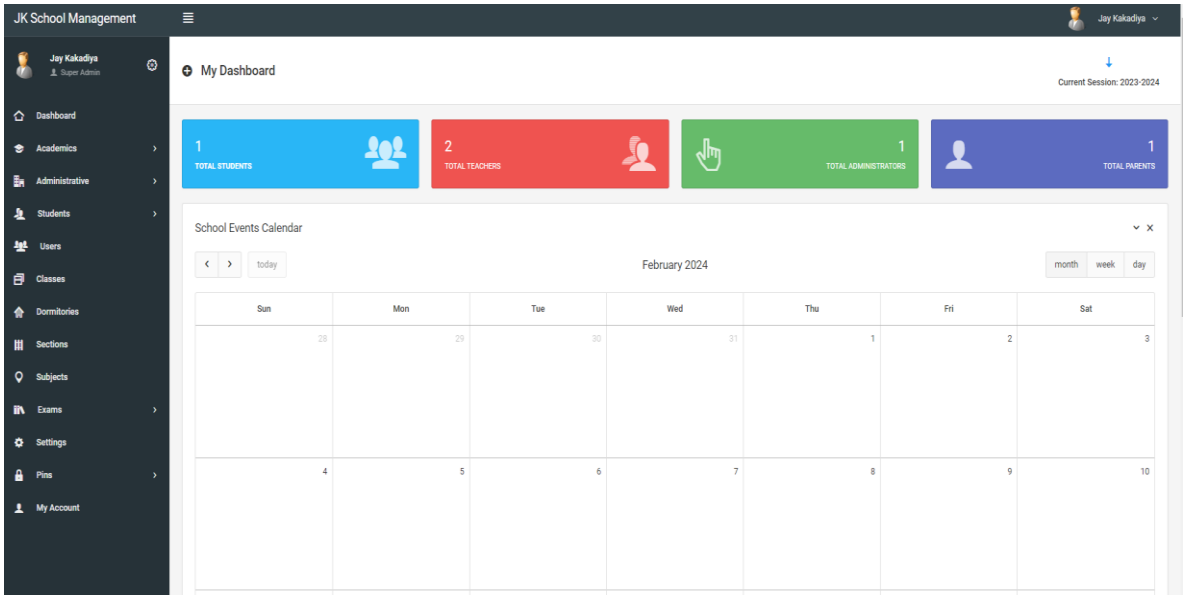


Figure 2 shows the dashboard of the school management system which shows all the working and involved criteria of application in this system. This dashboard includes academics, administration, students, users, classes, dormitories, sections, subjects, exams and many more. This shows the calendar and the data of the total number of students, teachers, administrators, and total no of parents. This dashboard is only for super administrators. It looks different for other users like students, administrators, parents, accountants, and teachers. Every user can manage their profile and change the password of their account by clicking on the '**My Account'** option.

Figure 3 shows information on users with names, sections, photos, email addresses, and actions. Also, it shows current session details i.e., 2023-2024 on the left corner of the page. The super admin or admin can create new users and manage the existing users by clicking on the options called '**Create New User'** and '**Manage Users**' respectively.

Figure 3: User Information Page

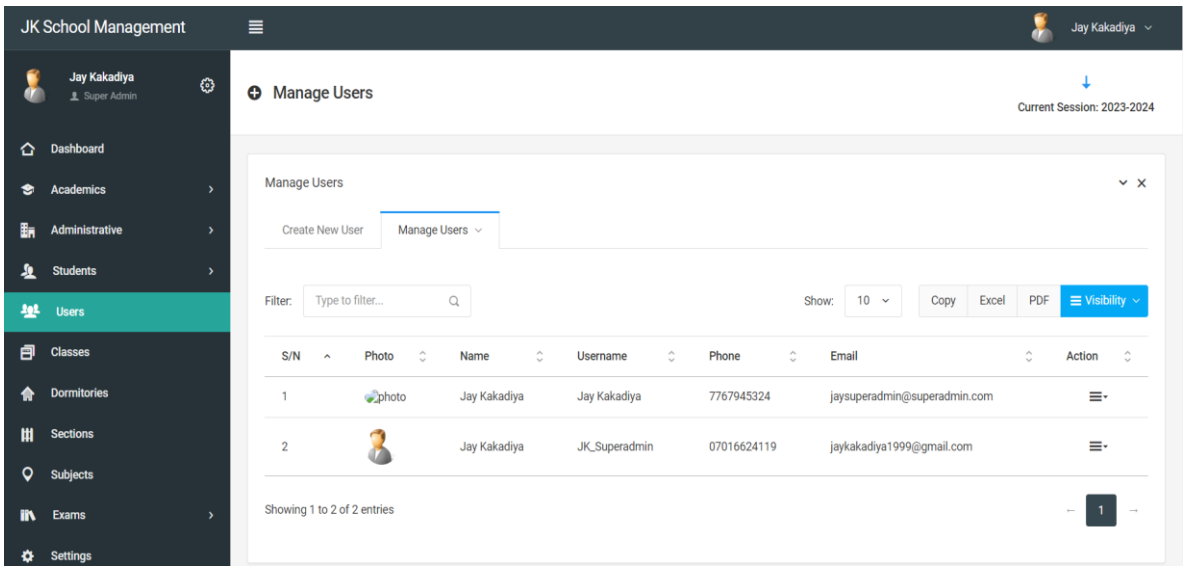


Figure 4 describes the student's section in which the admission column has been showing for filling in the details of new students who will be school admission. The personal details of the student such as full name, address, gender, phone number, date of birth, nationality, state, LGA (Local Government Area) in other words city, blood group, and passport photo functionalities have been shown. There is also a next button in the left below corner to go to the next page from this personal information page.

Figure 4: Personal Information Page of Student

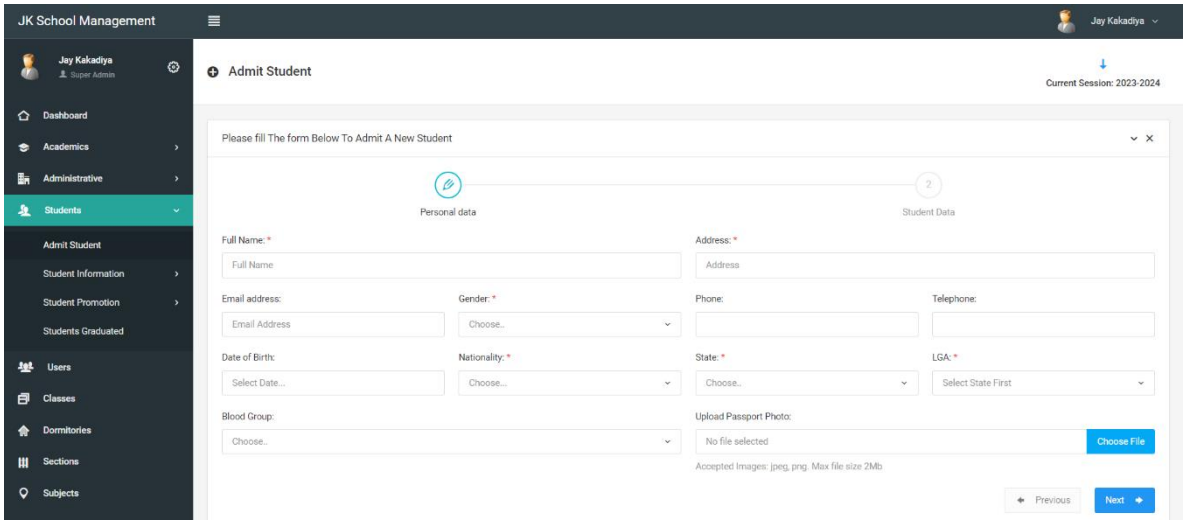
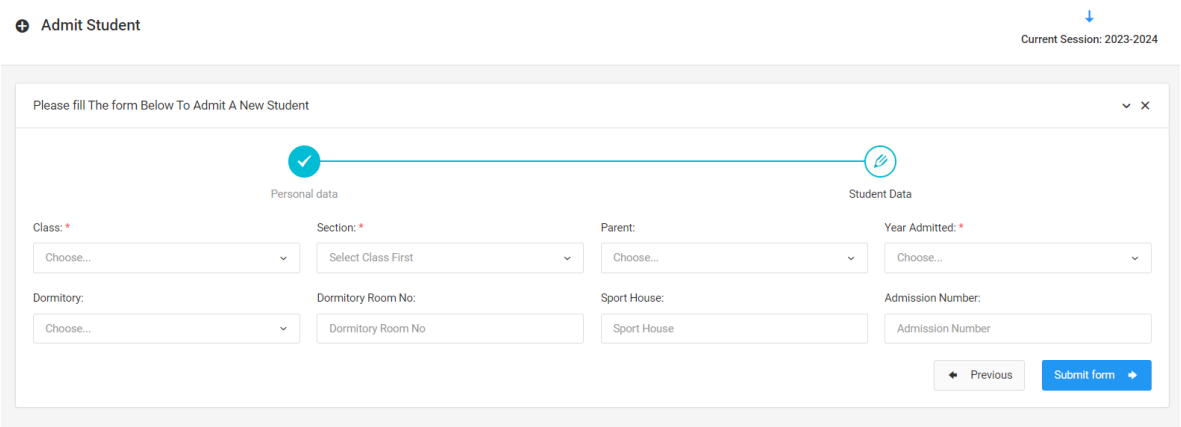


Figure 5 shows the information of students such as class, section, parent, admission year, dormitories, room number of accommodation, sport house, and admission number. After submitting this form, the super administrator or administrator can create the account of a new student.

Figure 5: Student Information Page



In this admission process, some information is mandatory such as student name, address, gender, nationality, state, city, class, section, and year of admission.

Figure 6 shows the layout of the managing timetable. Admin or super admin can create new time slots, add and update subjects of the class, and view the timetable.

Figure 6: Manage Timetable

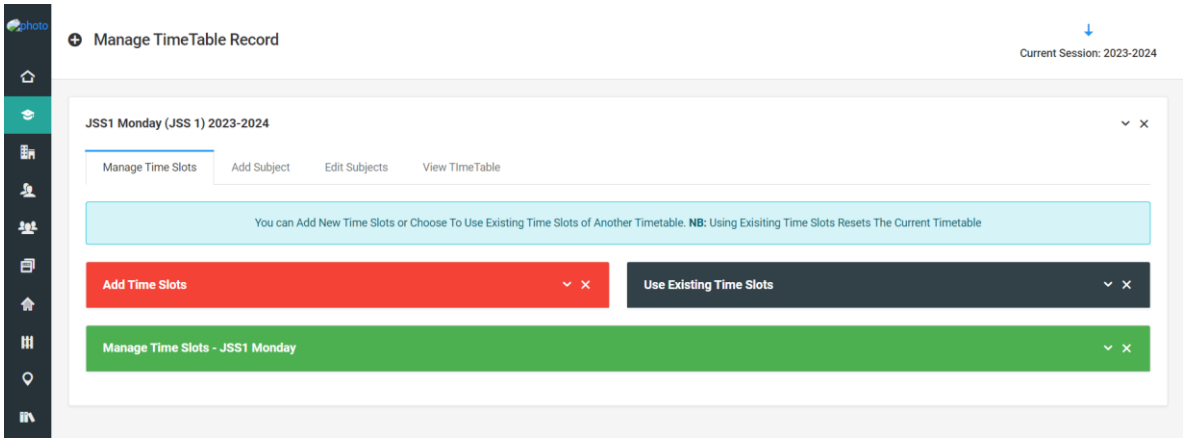


Figure 7 depicts the example of the created timetable for the JSS1 class. We can print the timetable in pdf format.

Figure 7: View Timetable

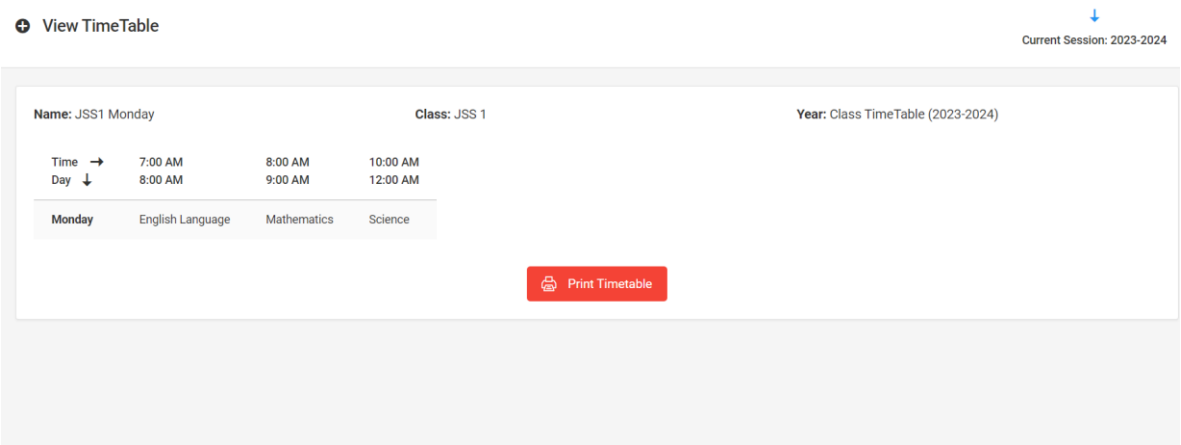


Figure 8: Manage Payment

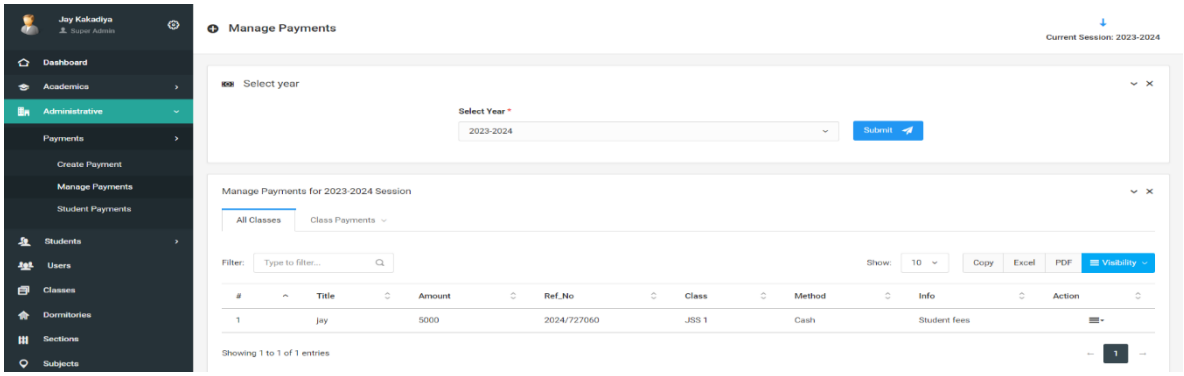


Figure 8 shows the layout of the payment page. Super administrator can add the new payment details, manage the payment details, and delete the payment details. They can show all the payments or filter the payment details by classes and years.

Figure 9 shows the information on all the classes. Super administrator and administrator can create new classes and manage the existing classes.

Figure 9: Class Information Page

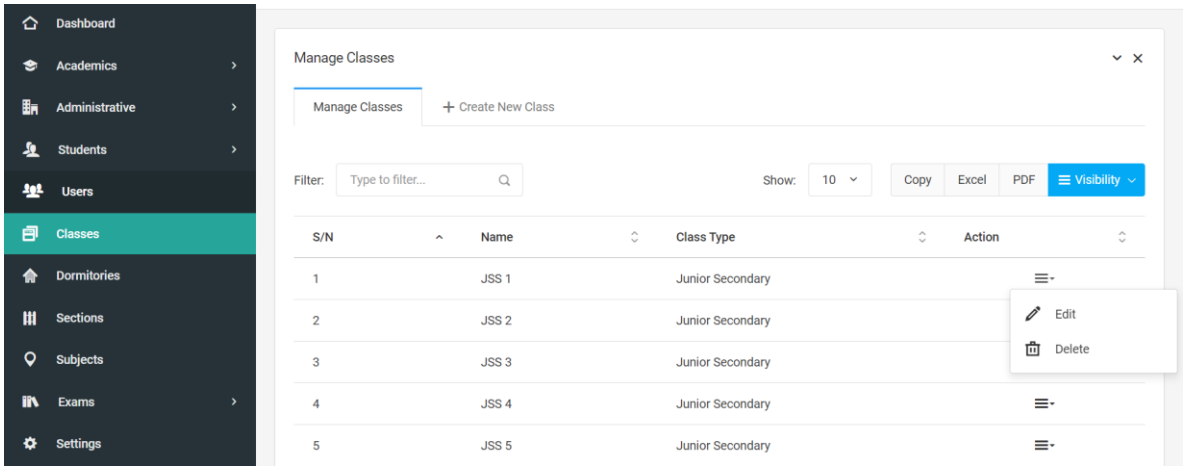


Figure 10: Dormitories

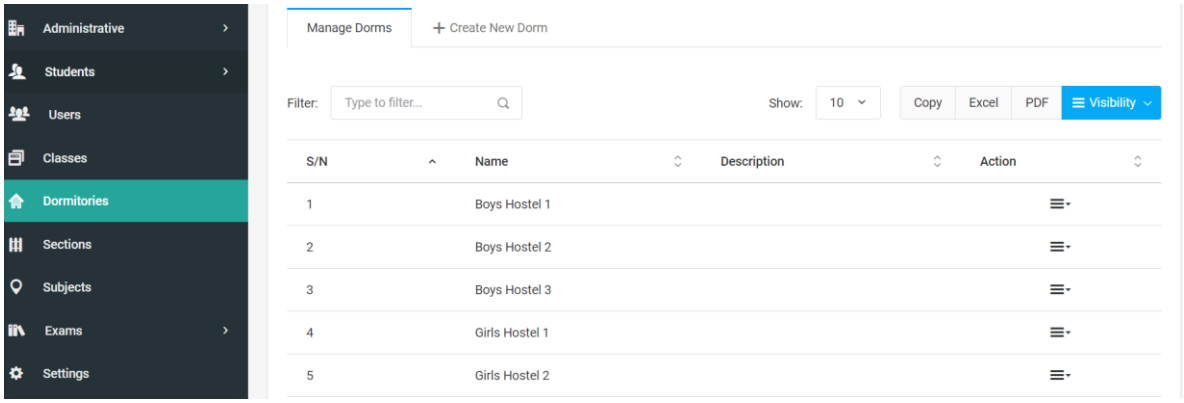


Figure 10 shows the dormitories page of the school management website. In this section, the super admin can view, add, modify, and delete the dormitories.

Figure 11 shows the section page, in which the super admin can manage all the sections of the particular class.

Figure 11: Manage sections of the class

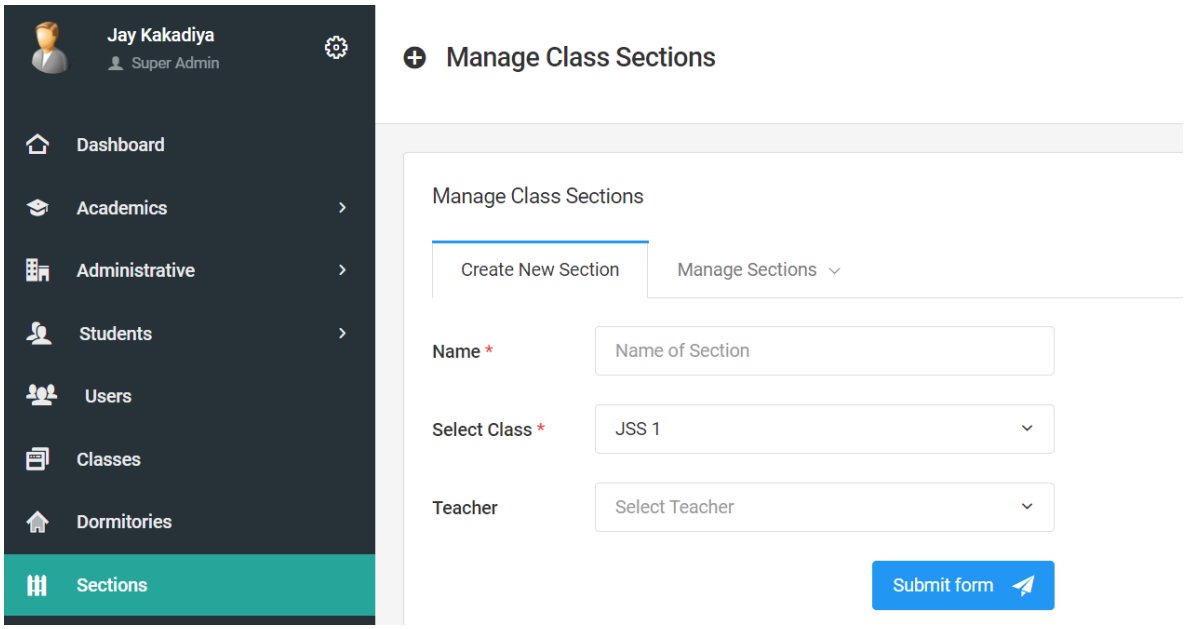


Figure 12 shows the subject page of the website. Administrators can manage the subject with the subject name, short subject code or name, class name, and teacher of that subject.

Figure 12: Manage Subjects

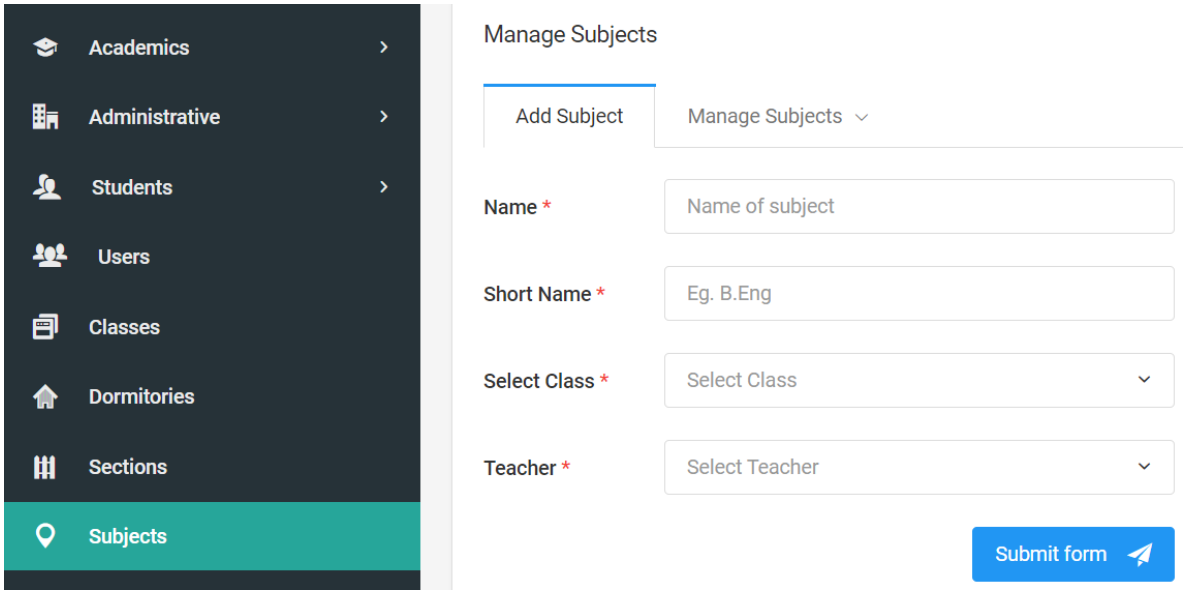
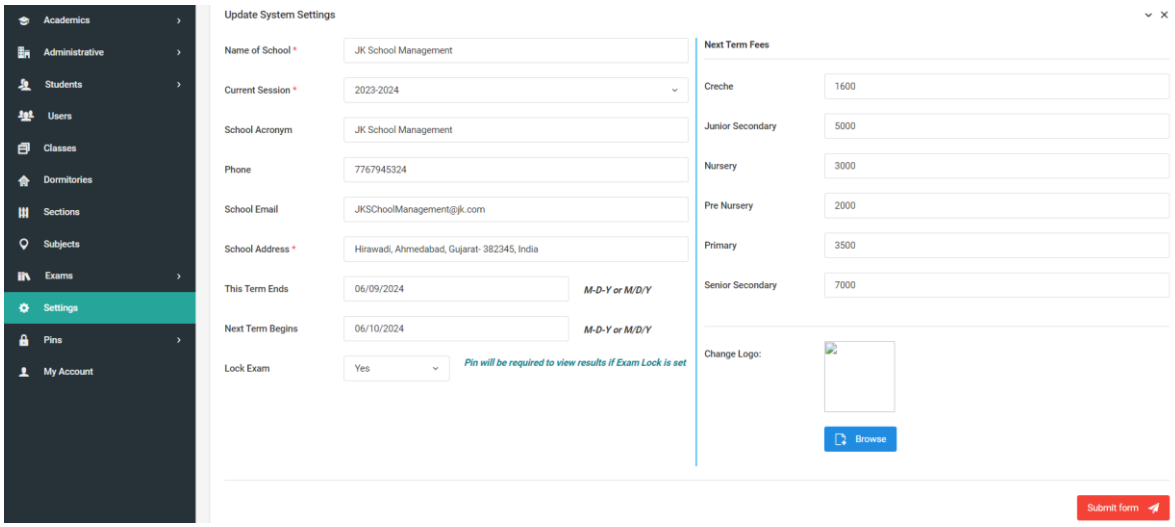


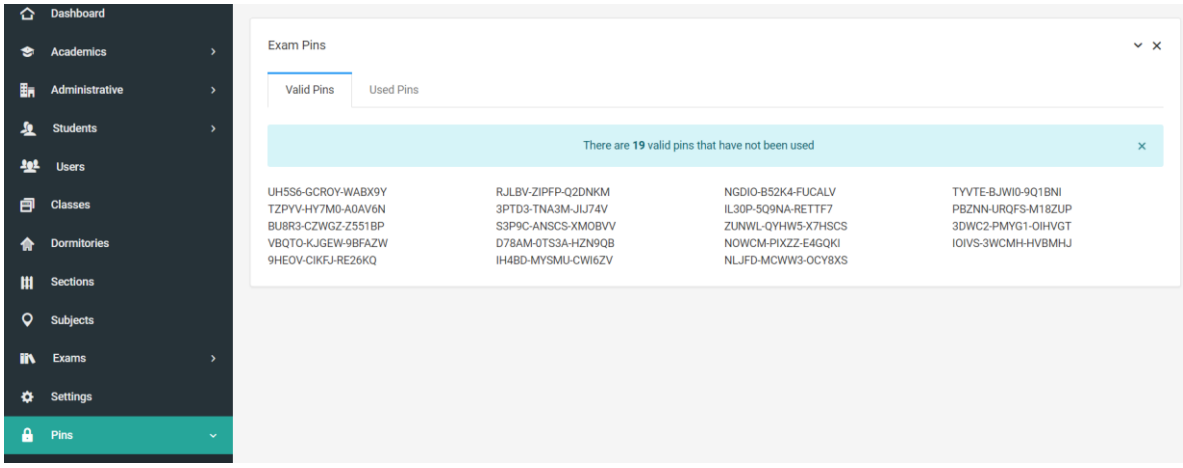
Figure 13 shows the setting page of the website. The super administrators can change the settings according to the client's needs.

Figure 13: Website Settings



Only the Super admin can generate the pins for the exam, as shown in Figure 14. These pins are required to see the result of the student and they can be used by students and parents. Without this pin student and parent cannot access the result.

Figure 14: Exam Pins



5. BENEFITS OF E-SYSTEM

Manual system in school management can present several drawbacks:

- **Increased Workload**: Manual systems require more time and effort for tasks, leading to a higher workload.
- **Prone to Errors**: Human errors in data entry can lead to inaccuracies in records and grading.
- **Limited Accessibility**: Physical records are not easily accessible outside of school premises.
- **Delayed Communication**: Paper-based communication methods can cause delays in communication.
- **Lack of Data Analysis**: Manual systems lack robust analytics, hindering data-driven decision-making.
- **Security Risks**: Physical records are vulnerable to loss, theft, or damage, posing security risks [18].
- **Limited Scalability**: Manual systems may struggle to adapt to the growing needs of educational institutions.

The E-system can bring many advantages to schools, colleges, and universities. It is beneficial for management, teachers, students, and parents. Implementing a school management website in India can offer numerous benefits in the context of educational technology (EdTech) in schools.

Streamlined Administration: School management websites automate various administrative tasks such as attendance tracking, timetable scheduling, fee management, and examination management. This streamlines administrative processes, reducing manual efforts and minimizing errors.

Improved Communication: These websites facilitate effective communication between teachers, students, parents, and administrators. Features such as messaging, notifications, and event calendars help keep stakeholders informed about important updates, events, and announcements.

Enhanced Parental Engagement: Parents can access their child's academic progress, attendance records, and upcoming events through the E-system. This fosters greater parental involvement in their child's education and enables them to stay actively engaged in their academic journey. They can communicate with the students while constantly monitoring their progress, inspiring and assisting them in achieving better achievements [18].

Efficient Resource Management: School management systems assist in managing resources efficiently, including classrooms, staff allocation, and inventory. This optimization ensures that resources are utilized effectively, leading to cost savings and improved productivity.

Data-Driven Decision-Making: These systems generate comprehensive reports and analytics on various aspects of school operations, such as student performance, attendance trends, and financial data [19]. School administrators can use this information to make data-driven decisions aimed at enhancing academic outcomes and operational efficiency.

Accessibility and Convenience: With a school management website, stakeholders can access information and perform tasks from anywhere with an internet connection. This accessibility enhances convenience for teachers, students, parents, and administrators, especially in a country as geographically diverse as India.

Promotion of Digital Literacy: By using school management websites, students and educators develop digital literacy skills as they navigate online platforms, interact with digital tools, and access educational resources. This exposure prepares them for the increasingly digitized world and fosters 21st-century skills.

Customization and Scalability: School management websites can be customized to suit the specific needs and requirements of individual schools. Additionally, they are often scalable, allowing schools to adapt and expand their use of technology as they grow or as their needs evolve over time.

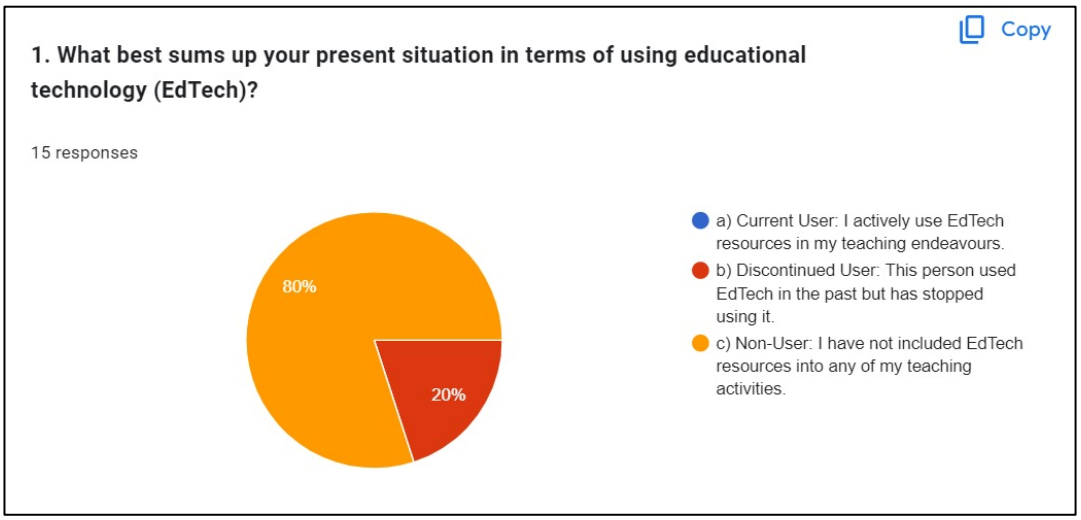
Data Security: The school software controls real-time data from the moment a student is admitted to a school until the day they leave. During this phase, the student takes a variety of coursework and exams. School administration software captures and stores all of the school's data, including educator notes, attendance, and other student information.

Overall, implementing a school management website in India can lead to greater efficiency, communication, and engagement within schools, ultimately contributing to improved educational outcomes for students.

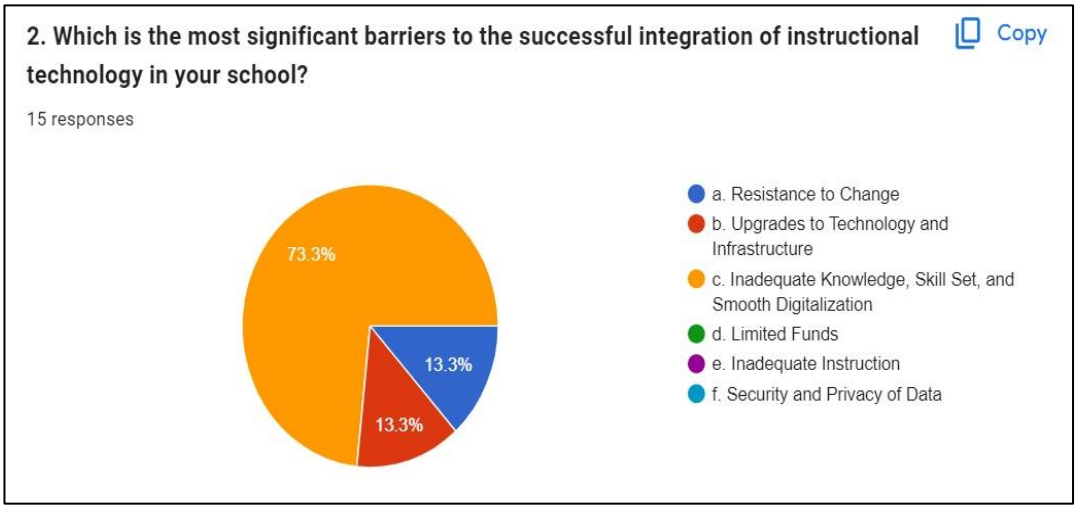
6. RESULTS AND DISCUSSION / EVALUATION

In this chapter, we discuss the results of our questionnaire responses and their relevant solutions by showing pie charts.

6.1. Questionnaire Result Statistics

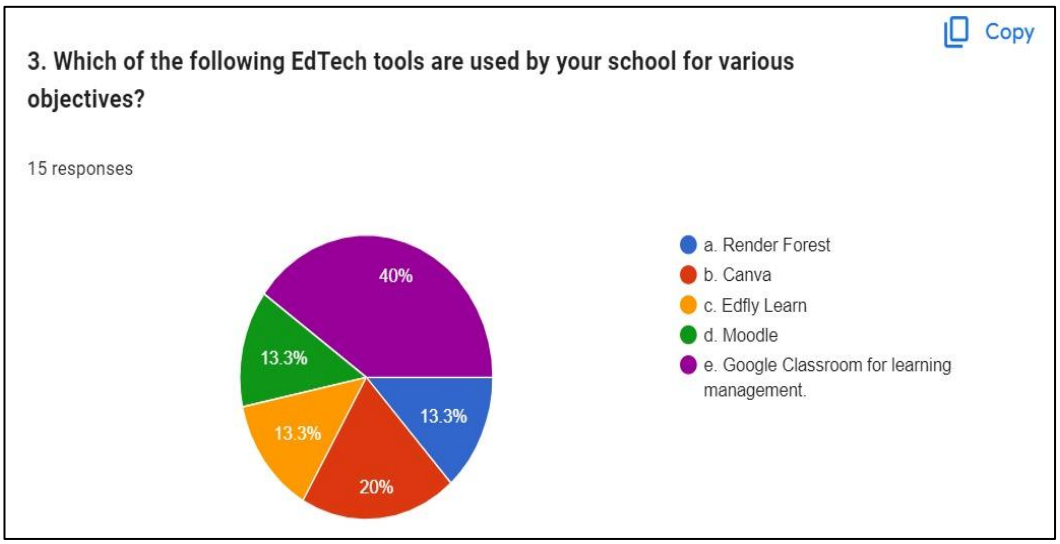


The graph above reveals that the majority of schools have not incorporated EdTech into their teaching practices. Many remain oblivious to the potential benefits EdTech offers for enriching curricular activities. Among all participants, a staggering 80% have yet to utilize EdTech either within their schools or elsewhere. The remaining 20% have dabbled with EdTech previously, but are not current users, largely due to a lack of proficiency in leveraging its capabilities effectively. This deficiency stems from a lack of awareness regarding the requisite skills and competencies needed for proficient utilization.



People are unable to imagine living in this rapidly expanding world without technology. The education sector has been so impacted by this revolution that the majority of administrators in schools and colleges use some form of technology in their classrooms. Still, many educators and administrators find it difficult to take the initiative to modernize their particular school or college with new technology.

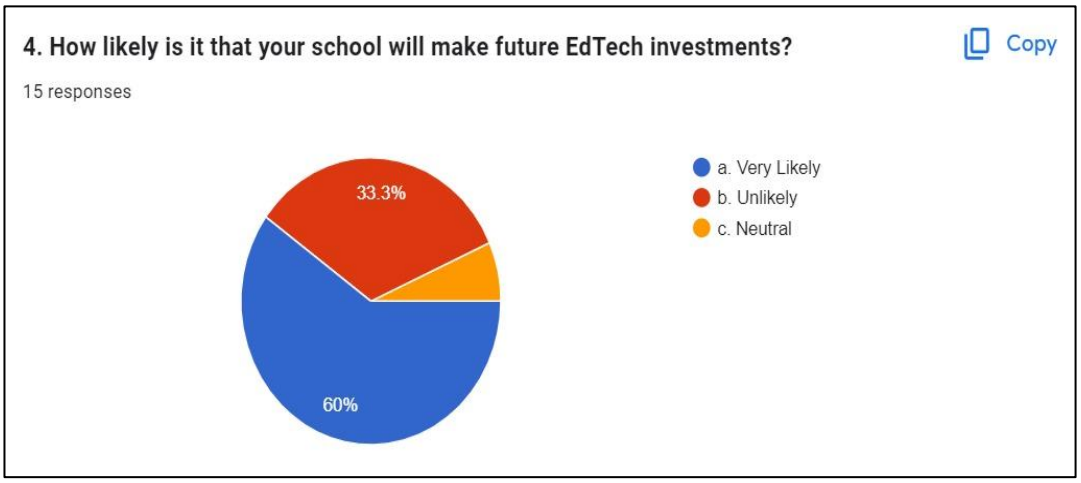
The above graph provides clear evidence, with 73.3% of users expressing the view that insufficient knowledge, skill sets, and seamless digitalization pose significant barriers to the successful integration of EdTech in their schools. Other identified obstacles include resistance to change and inadequate upgrades to infrastructure and technology.



Despite encountering these challenges, certain EdTech tools are actively employed in

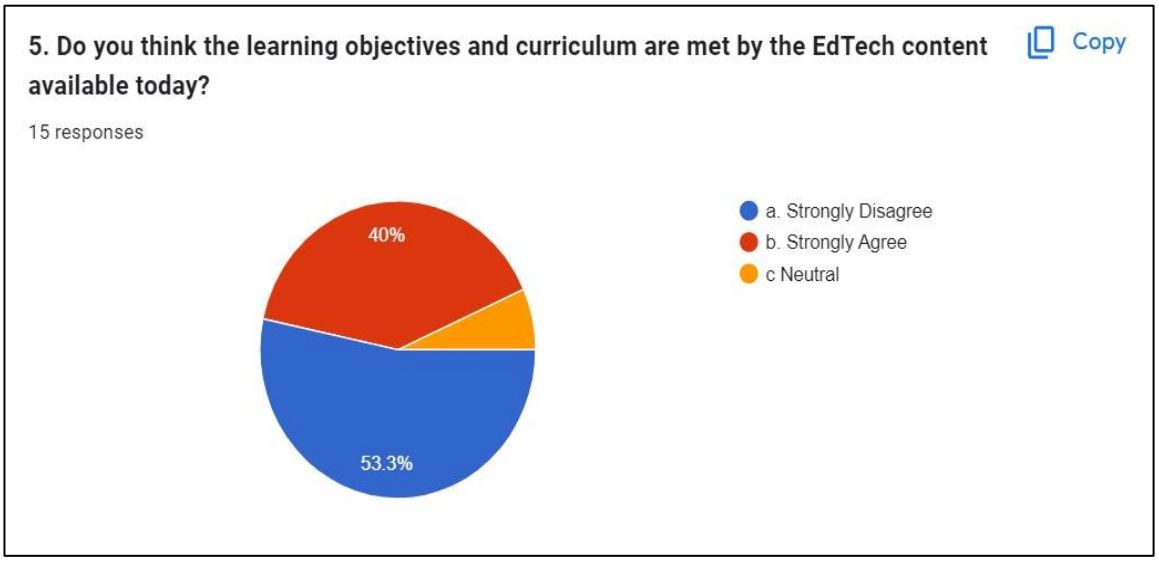
numerous schools for a variety of activities. As depicted in the above graph, 40% of users utilize Google Classroom within their learning environments, facilitating distance learning education for their students. Another 13.3% leverage Forest, which offers top-tier online branding tools, enabling the rapid production of animated content with superior quality. Additionally, 20% opt for Canva for designing and digital marketing purposes, while another 13.3% rely on Edify Learn and Moodle for their learning activities.

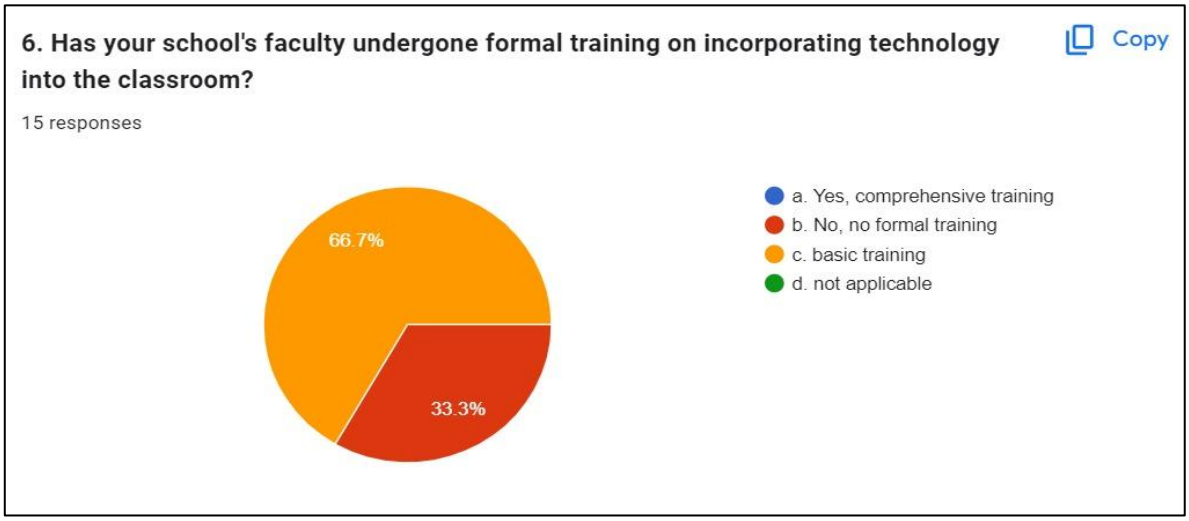
The below graph shows a growing number of schools are inclined to invest in EdTech, recognizing the potential benefits it offers to their students. However, 33.3% of users remain hesitant to commit to any form of EdTech investment. The remaining users adopt a neutral stance, finding it challenging to make investment decisions due to ongoing difficulties encountered with EdTech platforms.



Based on the response rate depicted above, it is evident that 53.3% of participants strongly disagree that EdTech can effectively meet their learning objectives and curriculum requirements. This dissatisfaction reflects a notable reluctance towards the use of EdTech within their schools. Conversely, 40% of respondents strongly agree that EdTech can align with their educational goals, indicating a positive perception of its potential. However, these contrasting opinions underscore the need for a comprehensive examination of the challenges associated with EdTech adoption. Such an analysis would be instrumental in guiding improvements in EdTech implementation to better align with the learning objectives and curricular requirements of schools. Additionally, exploring the reasons behind the differing

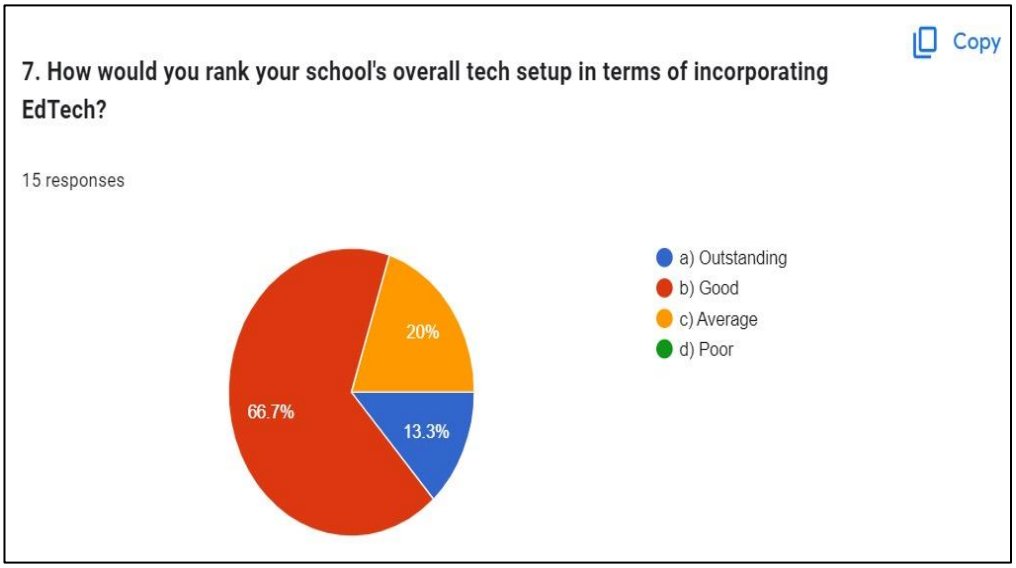
viewpoints could offer valuable insights into tailoring EdTech solutions to address specific needs and concerns within educational settings.





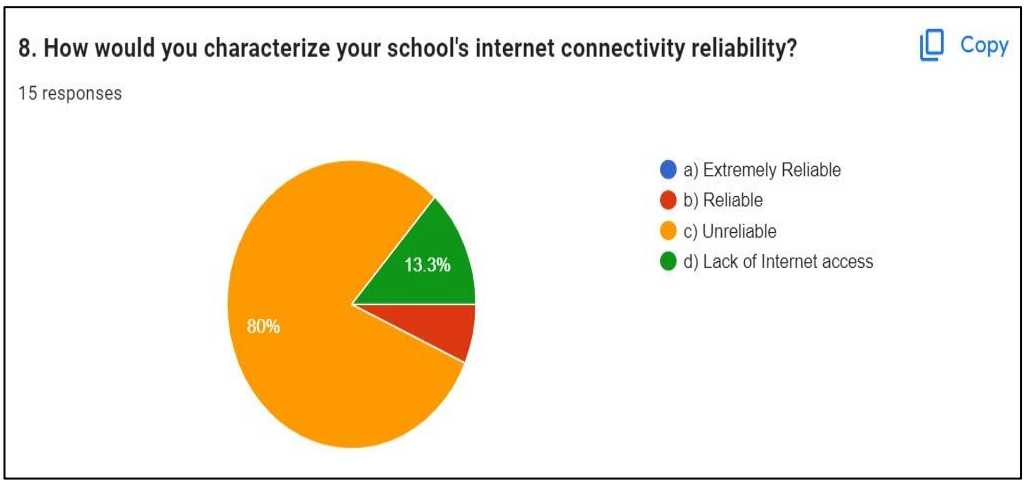
The findings from this survey reveal that a significant majority, approximately 67% of participants, perceive that their faculty have received only basic training in implementing EdTech into their classroom activities. This highlights a notable gap in their professional development, indicating a need for more comprehensive and advanced training initiatives. Additionally, a concerning aspect emerges as the remaining participants report not having

undergone any formal training at all. This underscores a potential deficiency in technical skill development among educators, suggesting a critical need for structured training programs tailored to enhance their proficiency in utilizing EdTech tools effectively. It is imperative for educational institutions to prioritize ongoing professional development opportunities to ensure educators are equipped with the necessary skills to leverage technology for optimal teaching and learning outcomes. Efforts should be directed towards designing comprehensive training programs that address various levels of expertise and cater to the specific needs of educators in integrating EdTech seamlessly into their pedagogical practices.

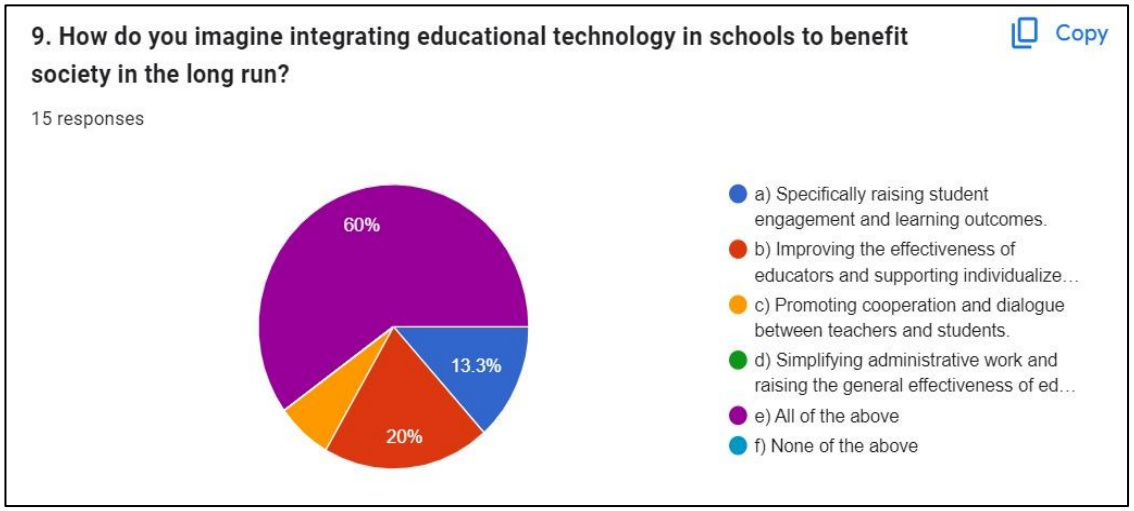


The survey findings suggest that a majority of participants (nearly 67%) are optimistic about their school's readiness to integrate EdTech, indicating a generally positive assessment of the current technology infrastructure across diverse educational institutions. However, a notable 20% of respondents view their school's EdTech setup as average, signaling a need for improvements to optimize technological resources and support systems. Conversely, around 13% of participants perceive their school's setup as outstanding, highlighting exemplary integration of technology into curriculum activities. This varied response underscores the importance of enhancing the overall EdTech ecosystem to cultivate effective learning environments in all Indian schools. Further initiatives aimed at bolstering infrastructure, providing comprehensive teacher training, and fostering innovation in educational technology are essential to address the diverse needs and aspirations of students and educators alike. Collaboration between stakeholders, including schools, government agencies, and EdTech providers, can play a crucial role in driving these enhancements and

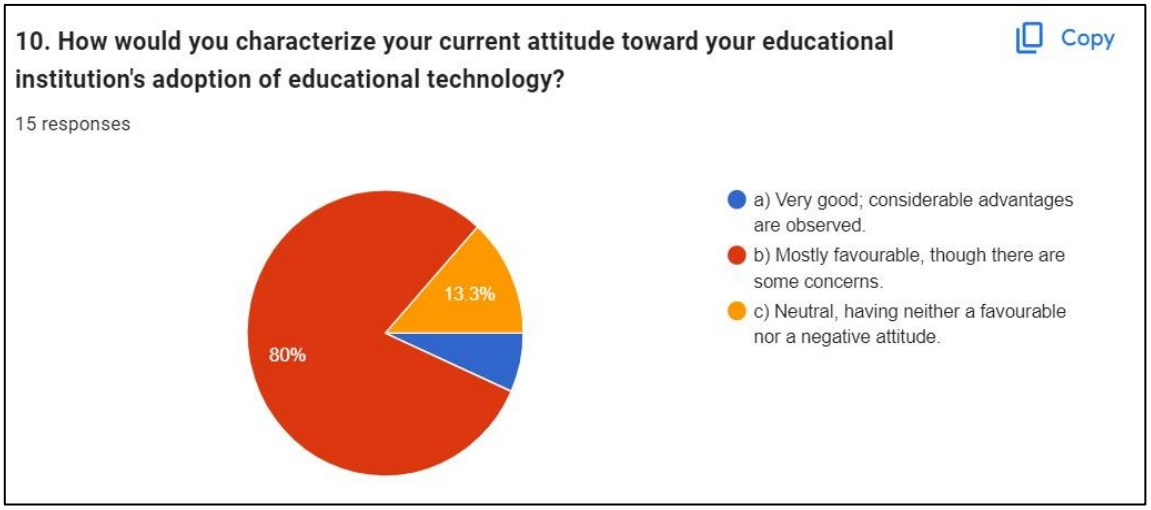
ensuring equitable access to high-quality digital resources and educational opportunities for all.



This survey underscores a critical concern regarding internet connectivity in schools, which is fundamental for effective EdTech integration. An overwhelming 80% of respondents describe their internet connectivity as unreliable, highlighting a significant obstacle to seamless EdTech implementation. Additionally, 13.3% of participants identify a lack of internal access within their school, further compounding the challenge. However, it's noteworthy that some participants reported having reliable internet connections. Despite this, there remains an urgent need for infrastructure improvements to ensure a more accessible and consistent online learning environment for all students and educators. Investing in robust internet infrastructure, including high-speed connectivity and internal network accessibility, is paramount to overcome these challenges and maximize the potential of EdTech in education. Furthermore, exploring innovative solutions such as mobile internet technologies and satellite-based connectivity can help bridge the digital divide and extend educational opportunities to remote and underserved areas.



The survey results reveal that a significant majority, constituting 60% of participants, believe that integrating educational technology (EdTech) in schools will yield numerous benefits. These include enhancing student engagement and improving learning outcomes, boosting the effectiveness of educators, fostering collaboration between students and teachers, and streamlining administrative tasks to enhance the overall effectiveness of the education system. Additionally, 20% of respondents emphasize the potential of EdTech integration to facilitate personalized teaching approaches. However, a notable 13.3% of responders express skepticism, believing that none of the aforementioned benefits can be achieved through EdTech implementation. These findings underscore the diverse perspectives on the potential impacts of EdTech in education and highlight the need for further exploration and discussion to address concerns and maximize the benefits of integrating technology in schools.

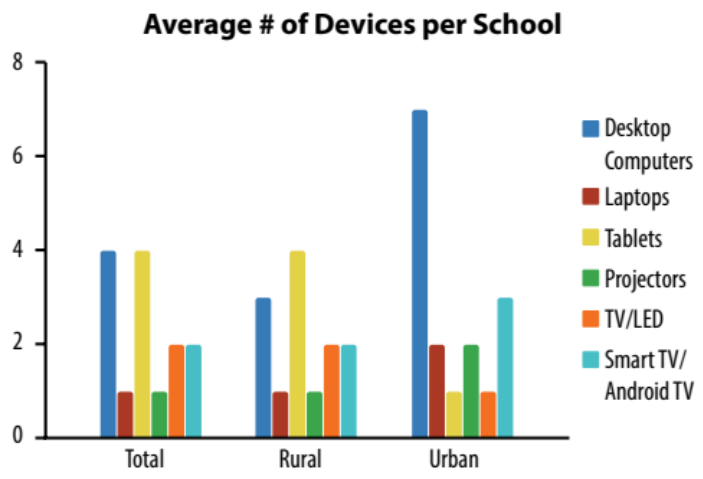


The pie chart above illustrates that a significant majority, comprising 80% of participants, perceive their school's attitude towards adopting EdTech educational technology as largely favorable. This positive outlook reflects a growing recognition of the diverse advantages associated with EdTech implementation in educational settings. However, 13.3% of respondents remain neutral in their decision, indicating a lack of awareness regarding both the positive and negative aspects of EdTech. Interestingly, a small yet notable portion of participants express a particularly positive view, believing that their school exhibits an exceptionally favorable attitude towards adopting EdTech technology. These findings underscore the varying perceptions and attitudes towards EdTech adoption within educational institutions, highlighting the importance of fostering informed decision-making and providing comprehensive support for effective integration. Additionally, efforts to enhance awareness and understanding of EdTech's potential benefits and challenges can contribute to shaping more informed attitudes and driving successful implementation strategies in schools.

6.2. Maharashtra Digital Schools Survey Result

The "Maharashtra Digital Schools Survey Findings Report" presents a comprehensive analysis and evaluation of the digital education landscape in Maharashtra, India. The survey included 1000 government schools chosen to mirror the diverse demographic composition of the state, encompassing urban, rural, and tribal areas across various regions. Out of these, 912 schools were identified as rural, 77 as urban, and 11 as tribal, respectively [20].

Figure 15: Average number of devices per school



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The above bar graph in Figure 15, provides the Average number of devices per school. The graph illustrates that urban schools have a significantly higher average number of desktop computers, laptops, and tablets compared to rural schools. Specifically, urban schools on average have approximately 7 desktop computers, which is the highest among all device categories and significantly surpasses the average in rural schools. Laptops and tablets also show a higher presence in urban schools, with averages around 3 and 2 respectively, while rural schools have fewer than 2 on average for these devices. This data underscores the digital divide between rural and urban educational institutions, highlighting the disparity in access to digital tools that can enhance the learning environment.

Figure 16: Schools' Engagement with Parents/Community

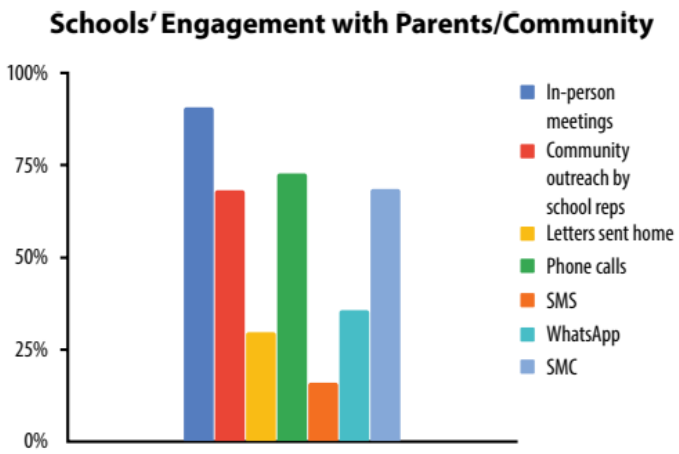

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Figure 16 visual representation of the various communication methods schools utilize to connect with parents and the community. The chart indicates that in-person meetings are the most prevalent form of engagement, with over 75% of schools adopting this approach. This is followed by community outreach by school representatives and letters sent home, both methods being used by approximately 50-60% of schools. Phone calls and SMS represent a moderate level of engagement, with around 25-35% of schools using these channels. WhatsApp, despite being a popular messaging platform, shows a lower level of usage for school engagement, with under 25% of schools employing it. The least common method, as per the data, is SMC also called school management committee, which is used by a relatively small percentage of schools. This distribution highlights the continued importance of traditional, face-to-face interactions in school communications, while also acknowledging the role of digital and mobile platforms in fostering parental and community involvement.

Figure 17 provides an insightful comparison of internet connectivity situations across different types of schools in Maharashtra: total, rural, urban, and tribal. The chart reveals that a significant proportion of schools, particularly in rural and tribal areas, rely on teachers using their own mobile internet, indicating a lack of dedicated school internet infrastructure. Urban schools appear to have better connectivity, with a higher percentage reporting reliable

internet every day and the ability for numerous devices to connect simultaneously without issues. However, across all school types, there is a notable percentage of schools that experience regular internet outages or can only connect one or two devices at a time. This data highlights the challenges faced by educational institutions in ensuring consistent and robust internet connectivity, which is crucial for leveraging digital resources and facilitating modern teaching methods. The disparities between different school types underscore the need for targeted efforts to improve internet access in under-resourced areas to bridge the digital divide.

Figure 17: School's Internet Connectivity Scenarios

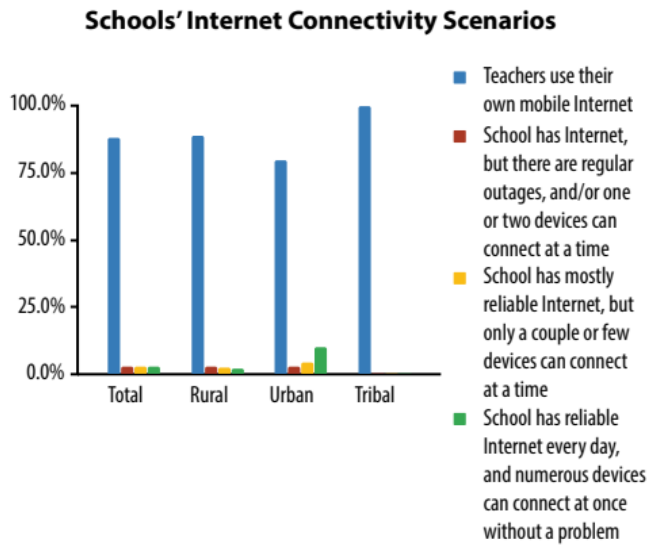

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Figure 18: Teachers' Preferred Digital Content Platforms

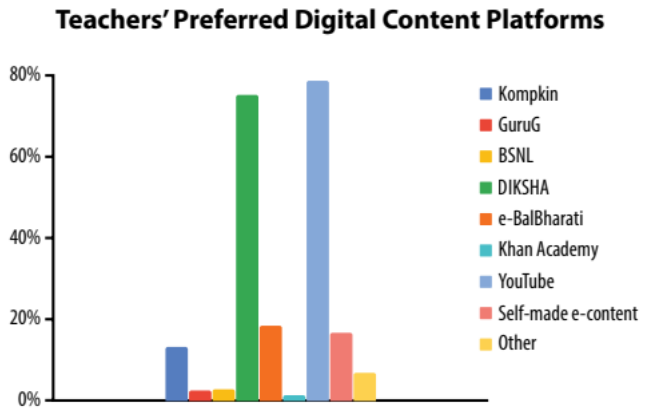

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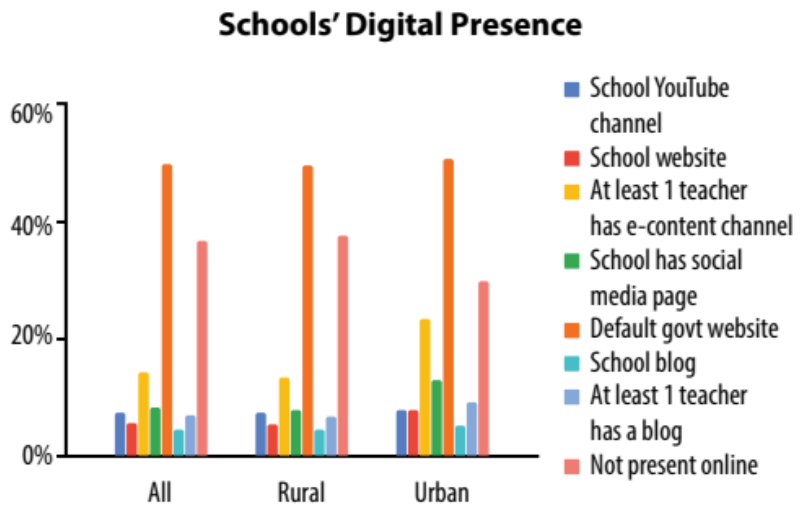
Figure 18 illustrates the preferences of educators when it comes to digital resources for teaching. The data shows a clear inclination towards two platforms, with DIKSHA being the

most favored, used by approximately 70% of teachers. YouTube also stands out as a significant resource, with around 60% of teachers utilizing it for digital content. Other platforms such as e-BalBharati, Khan Academy, and self-made e-content are less commonly used, each by less than 20% of teachers. Notably, platforms like Komplin, GuruG, and BSNL have minimal representation, indicating a relatively low preference among teachers. The category labeled "Other" suggests that there is a small percentage of teachers who use alternative platforms not listed in the chart. This distribution of preferences highlights the importance of user-friendly and accessible digital platforms that cater to the educational needs of teachers and students alike.

Figure 19: Schools' Digital Presence



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In figure 19, the bar chart titled "Schools' Digital Presence" provides a comparative analysis of the online footprint of schools across all, rural, and urban categories. The data indicates that urban schools have a more pronounced digital presence across most categories compared to their rural counterparts. Notably, the presence of a school website is the most common form of digital presence for urban schools, with over 40% having their own site, while rural schools lag behind at around 20%. School YouTube channels are also more prevalent in urban areas, with approximately 20% of schools utilizing this platform, compared to less than 10% in rural areas. The presence of at least one teacher with an e-content channel is similarly higher in urban schools. Social media pages, government-provided default websites, and school blogs show a modest presence, with urban schools again leading in adoption. The category of at least one teacher having a blog is the least represented, with very few schools indicating this form of digital presence. A small percentage of schools, particularly in rural areas, are not present online at all, highlighting a digital divide that may impact the accessibility of educational resources and the school's ability to engage with the wider community.

6.3. Discussion

The data gathered from the survey provides valuable insights into the perceptions and attitudes of participants towards the integration of educational technology (EdTech) in schools. The findings indicate a generally positive outlook towards EdTech adoption, with a significant majority (80%) of participants viewing their school's attitude as favorable. This suggests a growing recognition among educators and stakeholders of the potential benefits associated with incorporating technology into teaching and learning practices.

One of the key observations from the data is the widespread recognition of the advantages offered by EdTech implementation. Participants acknowledge its potential to enhance student engagement, improve learning outcomes, support individualized instruction, promote collaboration between teachers and students, and streamline administrative tasks. These perceived benefits align with existing research highlighting the positive impacts of EdTech on various aspects of education, including student achievement and teacher effectiveness.

However, it is noteworthy that a portion of respondents (13.3%) express a neutral stance towards EdTech adoption, indicating a lack of awareness or uncertainty regarding its potential implications. This underscores the importance of providing comprehensive information and support to educators to address any concerns or misconceptions surrounding EdTech integration. Educator professional development programs and ongoing training initiatives can play a crucial role in enhancing educators' confidence and competence in utilizing EdTech effectively.

Furthermore, the data also highlights a small but notable percentage of participants who perceive their school's attitude towards EdTech adoption as exceptionally positive. This suggests the presence of proactive measures or initiatives within these institutions to promote and support the integration of technology in teaching and learning practices. Identifying and disseminating best practices from these schools can serve as valuable insights for other institutions seeking to enhance their EdTech implementation strategies.

The discussion of the "Schools' Digital Presence" bar chart (Figure19) reveals several key insights into the current state of digital integration within educational institutions. The data

suggests a disparity in digital presence between urban and rural schools, with urban schools demonstrating a higher level of online engagement. This could be attributed to several factors, including better access to digital infrastructure, more resources for creating and maintaining an online presence, and potentially more training opportunities for teachers in urban settings.

The Strengths, Weaknesses, Opportunities, & Challenges (SWOC) analysis has been completed on the basis of a literature review and developments in the ecosystem of Edtech start-ups. India is currently experiencing growth in both the basic and higher education sectors. The massive movement of people from the countryside to the cities created the perfect setting and chance for Edtech start-ups to cater to the demands of the "content-hungry" urban population of the new millennium. As internet connections get better (e.g., 4G and 5G), there is an increasing demand for digital information, interactive e-learning, entrance exam preparation, distance, and digital learning. The majority of city-based schools and universities are now unduly dependent on digital and e-learning solutions for academic delivery as a result of it driving up demand for Edtech. These offer Indian Edtech start-ups a lot of potential.

Four factors are driving the growth of the Edtech eco-system in India: (a) the country's youthful population; (b) parents' rising disposable income; (c) lowering the cost of internet data; and (d) low-cost portable learning tools. From 500 million in 2020 to more than twice that number by 2025 is the prediction for smartphone users. Edtech startups have faced competition from the test-prep and auxiliary coaching industries, but they haven't been able to break through to the foundational education value chain. Digital technology can be incorporated into the educational system to complement traditional education, not to replace it. Edtech companies have to consider the truth when creating their products. The use of digital technology in the education sector has advanced due to the COVID-19 pandemic, but Edtech companies still need to work hard to keep stakeholders involved. New products and ongoing innovation might be able to achieve this.

When the pandemic ends, colleges and schools reopen, and life returns to normal, Edtech platforms may face difficulties with student retention. Edtech start-ups face a number of challenges, including a small client base, difficulty determining the best pricing for their offerings, a lack of diversification, a lack of product distinction, and elevated costs for

acquiring customers. It is imperative to innovate, integrate, facilitate learner outcomes, diversify into related segments, scale up, and integrate. Edtech startups must heavily utilize Augmented Reality (AR) and Virtual Reality (VR) to improve user experience and deliver visible parts of learning that cannot be provided in a traditional, offline class environment. Edtech startups need to focus on learning new digital skills so that students are prepared for careers in the future. For a company to be sustainable over the long run, diversification into the nearby Edtech market is another feasible option. There are prosperous start-ups that offer tutoring and study materials to students. Another strategy to enter the higher education and business learning sectors is through MOOCs. Higher education institutions should establish strategic partnerships with Edtech companies now or later. The terms "e-learning," "blended learning," and "distant education" turned out to be the most popular ones. The findings show that the most researched areas in this field are modelling, higher education, technology adoption, and technology. In order to provide students with the best learning support possible, education platforms should play a significant role in assisting physical institutes in their transition to online learning.

Overall, the findings underscore the importance of fostering a supportive environment and providing adequate resources and training opportunities to facilitate successful EdTech integration in schools. Collaborative efforts between educators, administrators, policymakers, and technology providers are essential to address challenges, leverage opportunities, and maximize the potential of EdTech to transform teaching and learning experiences in the long run.

7. CONCLUSIONS AND RECOMMENDATIONS

With the help of analysis of the conducted survey, this research is helpful in revealing the present state of adoption of Edtech in Indian schools. The key finding of the result shows that there is the presence of a significant gap in the integration of EdTech in which the majority of the users are either not using Edtech at all or discontinued the use of Edtech due to the absence of required knowledge. It has been found that there are various challenges including inadequate digitalisation and resistance to change which results in a lack of adoption of Edtech in Indian schools. This is helpful in highlighting the challenges faced by administrators and educators in implementing Edtech to advance the learning experiences. Despite all these problems, it can be found that there is a growing awareness in Indian schools regarding the potential benefits that technology offers. It has been found that Indian schools are willing to invest in Edtech demonstrating a positive inclination in attitude regarding the recognition of the advantage that Edtech can bring to Indian education. The research underscores the pressing need for reliable internet connections and emphasizes the importance of future professional development through streamlined training. Furthermore, it reveals diverse perspectives on the effectiveness of Edtech and its compatibility with educational objectives. Once barriers are identified and faculty members are adequately trained, successful integration of Edtech into Indian schools becomes feasible. Enhanced internet infrastructure stands as a pivotal factor in fostering a conducive online learning environment for students.

Future research should delve into the challenges and needs faced by schools and educators across different regions of India, conducting thorough examinations through interviews with administrators, educators, and students to gain insights into the contractual factors influencing the adoption of Edtech. Additionally, there's a critical need to explore the impact of socio-economic and cultural factors on the integration of Edtech in schools, contributing to a comprehensive understanding of the educational landscape. Research efforts should aim to develop targeted training programs for educators, addressing the barriers hindering effective integration.

Moreover, future research must continuously assess and monitor emerging Edtech tools, evaluating their suitability within the Indian education system. This exploration should also consider the role of government initiatives and policies in Edtech adoption, fostering

collaboration between the private and public sectors to drive technical innovation in education. Bridging the gap between theory and practice is paramount, and future research endeavors should provide actionable recommendations for educators, policymakers, and other stakeholders to shape the future of Edtech in Indian schools effectively. This includes identifying best practices, highlighting areas for improvement, and fostering a collaborative environment conducive to innovation and progress in educational technology.

8. REFLECTION

Through this research, insights into the reasons behind India's limited adoption of EdTech in school education are illuminated. It sheds light on the impact of EdTech on India's educational landscape and serves to identify its potential benefits within Indian schools. The research delves into various types of EdTech tools, exploring their applications in facilitating online exams, video recordings, and creating conducive learning environments for students. A survey conducted as part of this research reveals that the primary barriers to successful integration of instructional technology in Indian schools include insufficient knowledge, limited digitalization infrastructure, and inadequate skill sets among educators. It highlights the prevalent issue of underutilization due to a lack of proficiency and training in utilizing EdTech resources effectively.

As technology continues to advance, many Indian schools are now preparing to integrate EdTech into their curriculum activities. However, a significant obstacle lies in the unreliable internet connectivity faced by these schools, hindering their ability to fully utilize EdTech resources. Efforts are underway to establish more reliable and consistent internet access across these institutions. Additionally, it iss evident that the majority of school staff have only received basic training in incorporating EdTech into their classrooms, highlighting the urgent need for further training initiatives aimed at educators and other stakeholders.

The findings of this research emphasize the importance of taking a holistic approach, addressing both human and technological factors to ensure the equitable, effective, and sustainable integration of EdTech in the education sector. Educational institutions, policymakers, and EdTech providers can leverage these insights to develop targeted strategies that align with the unique opportunities and challenges presented by the educational landscape in Indian schools. This collaborative effort is essential in maximizing the potential benefits of EdTech and fostering innovation in education.

Through this research, we gain valuable insights into the adoption of EdTech in Indian schools, providing comprehensive information on the current challenges, landscape, and perceptions of school educators. When designing and developing the school management system, particular attention was given to meeting the needs of the school, including key operations such as admissions, enrollment, accounting, student information systems, evaluations, and report generation. The implemented e-school system is functional and has

enhanced the school's transaction processes, aligning with earlier findings of the study. Utilizing this system has been advantageous for school management, staff, parents and their child, with its high functionality, accessibility, and availability contributing to its overall quality and performance. Functionality, accessibility, and availability were all very high points of the system's overall quality and performance.

In my understanding, there is a growing demand every day for accessible and affordable internet connections with sufficient bandwidth, especially through digital platforms. EdTech businesses are increasingly influential in the expanding digital landscape of the education sector, a trend further accelerated by the COVID-19 pandemic. Governments and educational oversight bodies have long awaited significant technological advancements in education to improve outreach and increase the gross enrollment ratio (GER) in schools, colleges and universities. They aim to introduce analytical tools to evaluate investments in the education sector and transform the teaching-learning process. Therefore, I believe there is a need to promote the benefits of EdTech to educational institutions, faculty, and students, encouraging their use of EdTech in their curriculum.

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10.APPENDICES

DECLARATION

I, **Jay Chaturbhai Kakadiya** declare that I am the sole author of this Project; that all references cited have been consulted; that I have conducted all work of which this is a record, and that the finished work lies within the prescribed word limits.
This work has not previously been accepted as part of any other degree submission.

Signed: .....
Date: 22/02/2024

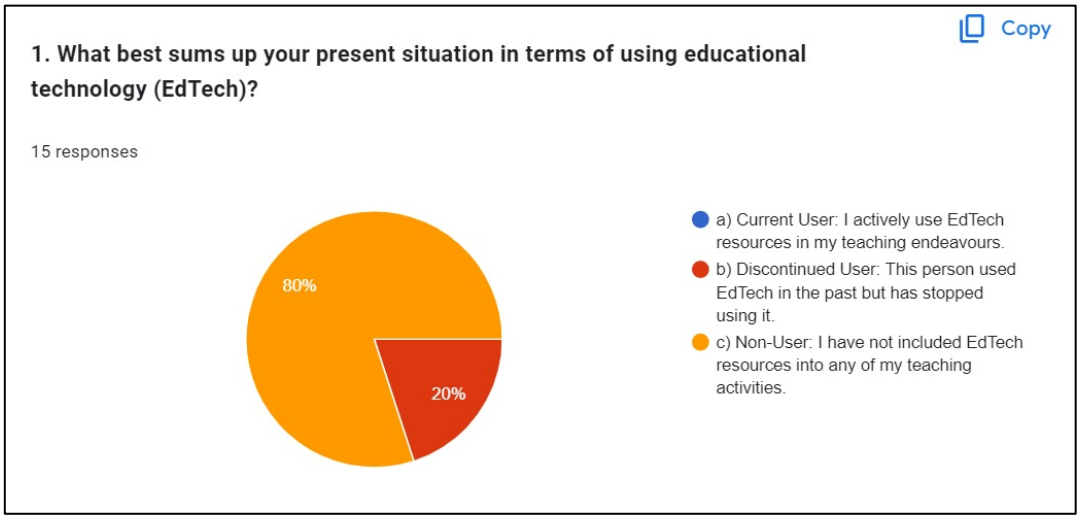
FORM OF CONSENT

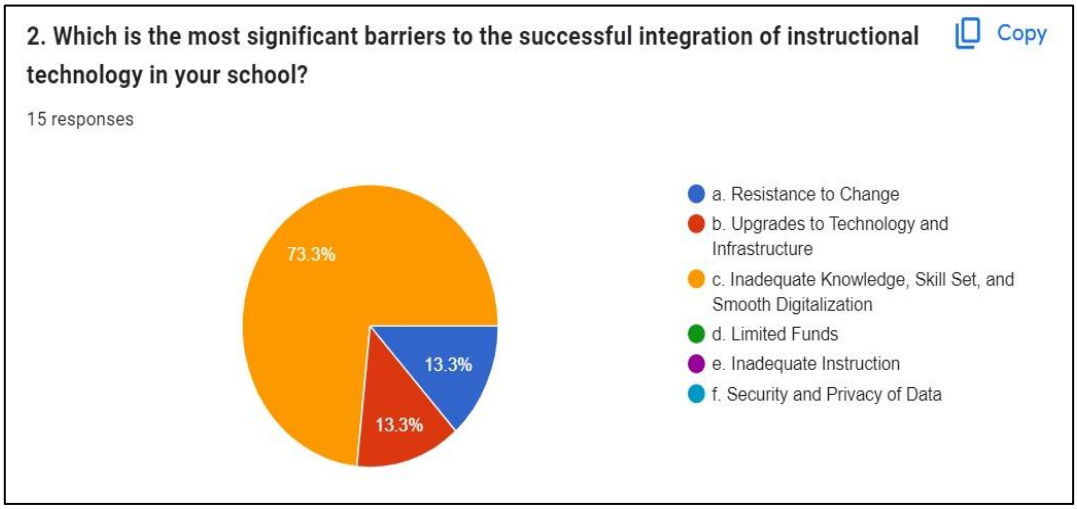
I **Jay Chaturbhai Kakadiya** hereby consent that my Project, submitted in candidature for the *M.sc. Data Science and Analytics* degree, if successful, may be made available for inter-library loan or photocopying (subject to the law of copyright), and that the title and abstract may be made available to outside organisations.

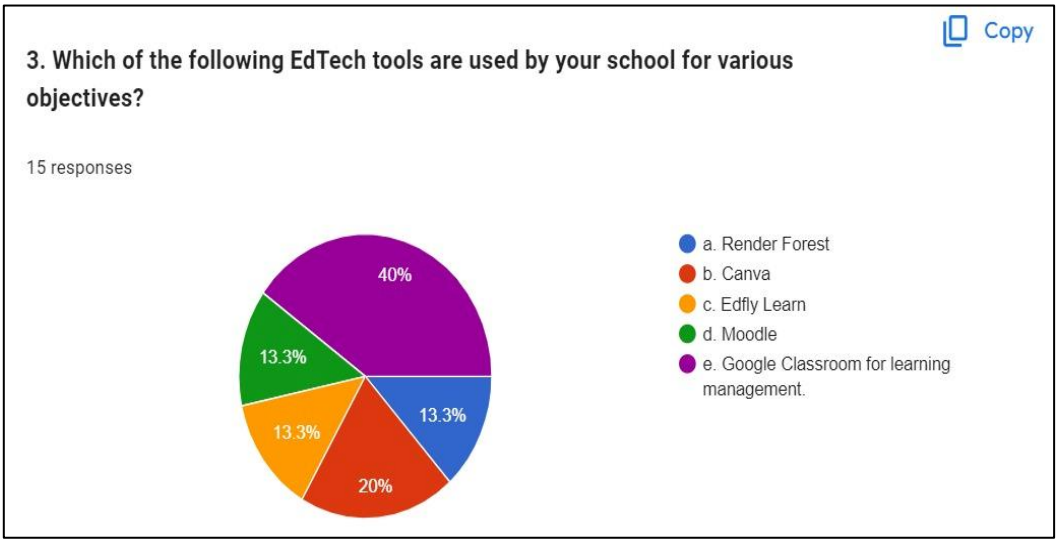
Signed: .....

Date: 22/02/2024

RESULTS AND DISCUSSION / EVALUATION







4. How likely is it that your school will make future EdTech investments?

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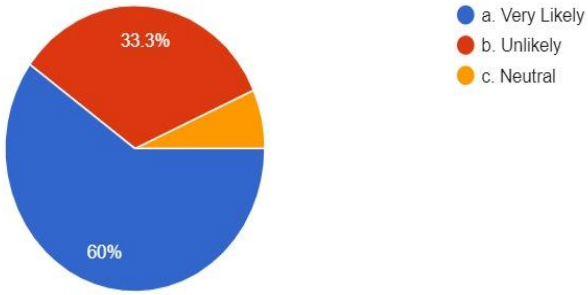
15 responses



5. Do you think the learning objectives and curriculum are met by the EdTech content available today?

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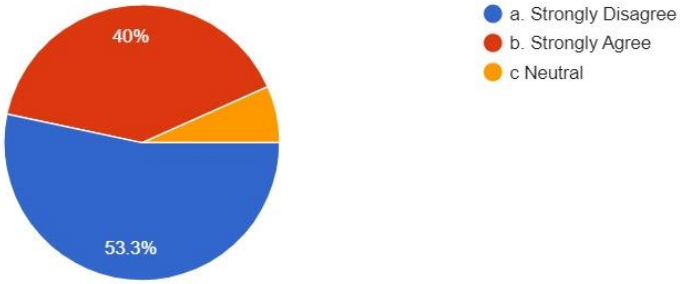
15 responses



6. Has your school's faculty undergone formal training on incorporating technology into the classroom?

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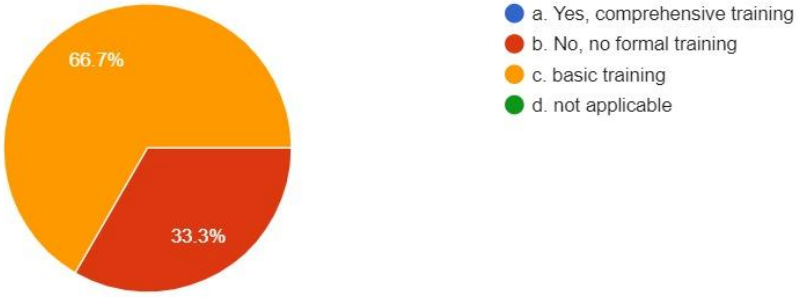

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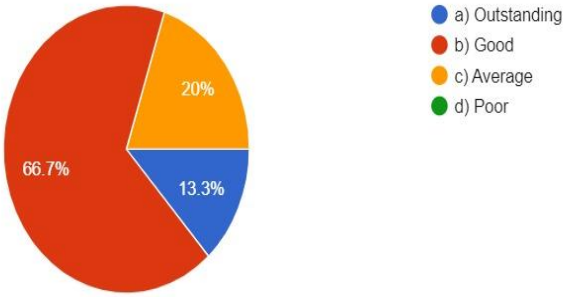
7. How would you rank your school's overall tech setup in terms of incorporating EdTech?

15 responses



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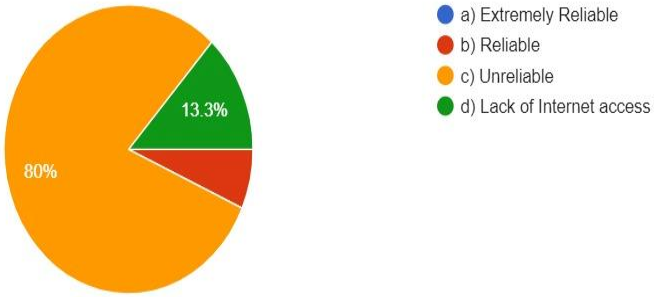
8. How would you characterize your school's internet connectivity reliability?

15 responses



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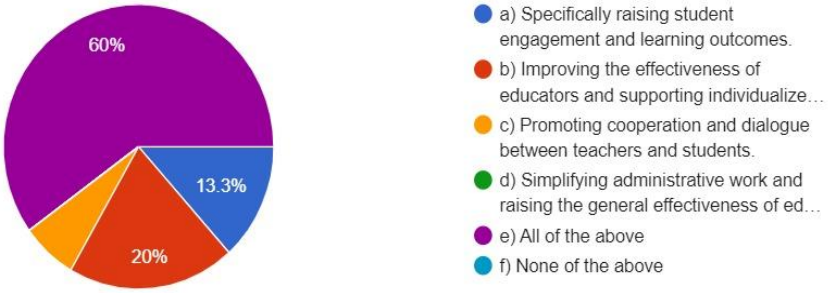
9. How do you imagine integrating educational technology in schools to benefit society in the long run?

15 responses



10. How would you characterize your current attitude toward your educational institution's adoption of educational technology?

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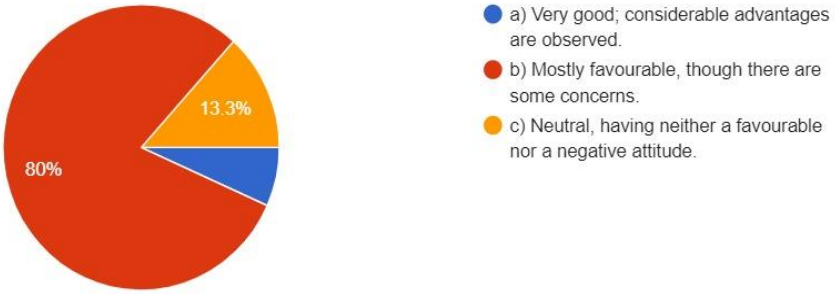
15 responses



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