Education: Conventional to Digital

A DISSERTATION

Presented to the Department of Business & Media

program at Selinus University

Faculty of Business & Media

in fulfilment of the requirements for

the degree of Doctor of Philosophy in Business and Media

Education:

Conventional to Digital

Index

Declaration

I do hereby affirm that I am the sole author of this dissertation on Conventional and Digital Education. The contents in the dissertation are the result of the research that I have done on the topic and my experience in the industry. The research submitted for the degree of Doctorate in Business and Media at Selinus University is my original work. The material, articles and data referred in the dissertation have been cited in the thesis.

Date :

STUDENT SIGNATURE

STUDENT ID : UNISE 1081 IT

Acknowledgement

I would like to take this opportunity to thank Selinus University for giving an opportunity to the working professionals to continue their learning through the e-Learning platform offered at the University.

I am thankful to all those who have helped me in my journey and stood with me in the thick and thin at the professional front. My teachers at the University and college have always nourished and encouraged my skills as a leader. I am grateful to team UnfoldU for their cooperation.

Most importantly I am thankful to my father who has been my torch bearer and the source of inspiration for me in all walks of my life.
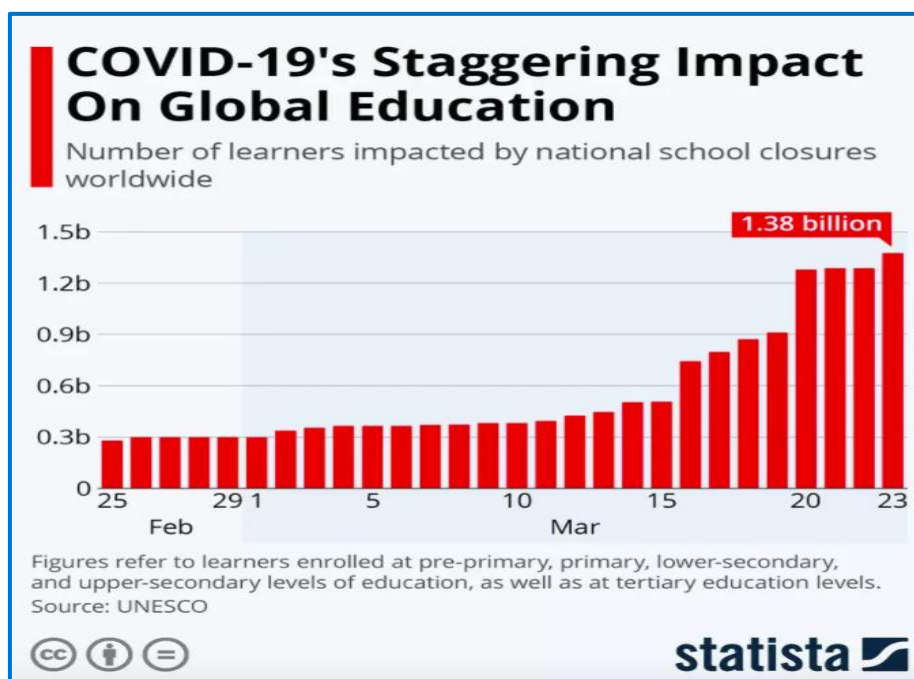
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Abstract

Someone has rightly said that education for our society is what is blood for the human body. Just as a human body cannot function without blood similarly a society cannot function without education. *Transformation of Indian Education System from Ancient Period till now* by Prashant Gupta mentions (https://www.linkedin.com/pulse/transformation-indian-education-system-from-ancient-period-gupta/)[1] that education system has been divided into 4 eras - the Vedic stage, the pre independence era, the post independence era and the current era ie. the digital era. In the Vedic or ancient times there was the Gurukul system of learning where a handful of pupils were taught by Guruji. There was a different teacher for a different subject. One Guru would teach philosophy and the other would teach physics and so on. Times changed and so did the schooling system. Curriculums like CBSE, ICSE, IB and Cambridge started being followed. Private players entered the teaching industry and it became a profitable source of income for businessmen. The admission of more and more students in one class started damaging the teacher pupil ratio. It started working like a vicious circle.

The teacher centred method being followed in the classrooms gave rise to the need of coaching centres where the students were able to revise the chapters taught in the classroom in a better manner. But the problem of juggling the time in school, extracurricular activities and coaching centres was taking a toll both on the health of the students as well as their minds.

COVID-19's Staggering Impact On Global Education

Number of learners impacted by national school closures worldwide

Figures refer to learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education, as well as at tertiary education levels. Source: UNESCO

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[1] (https://www.linkedin.com/pulse/ transformation-indian-education-system-from-ancient-period-gupta/)

Education: Conventional to Digital

Figures refer to learners enrolled at pre-primary, primary, lower secondary, and upper secondary levels of education, as well as at tertiary education levels[2]

The infiltration of digital education has solved these problems. Students now have access to numerous resources, animated video links and a lot of e-learning products that are working day and night to enhance their user experience. Through the digital medium a teacher is able to teach n-number of students at the same time, sitting in their respective homes at different corners of the country. Through the powerful medium of digital education (e-learning) the students get the chance to study the subjects from the teacher of their own choice as per their suitability.

Malcolm X once said that *Education is the passport to the future for tomorrow belongs to those who prepare for it today*. The power of online learning was established in times of COVID 19 when students and teachers were forced to stay home and the learning process was put to a halt. According to a study by the World Economic Forum, there are currently more than 1.2 billion children in 186 countries affected by school closures due to the pandemic.

In such times, e-learning was sought as a boon for the education sector that helped students, teachers and parents in staying home and continuing the process of learning and development from the safety of their homes.

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[2]Figures refer to learners enrolled at pre-primary, primary, lower secondary, and upper secondary levels of education, as well as at tertiary education levels

1. Introduction

Education has always been the root of development of any society. Any civilization that has grown, has always developed on the basis of the education. Lifestyle and the learning of the people of irrespective of times and civilizations has happened because of the Education structure. Indian society is considered to have around 69% of its population under the age of 35 years that evidently shows that such huge demography is either adopted the new format of education or they are on the brink of shifting to the new format and add new skills to their existing sets. The Education Reformist and prominent face of the progressive women movement, Sister Nivedita in her article *Indian education system a comprehensive analysis* (https://www.researchgate.net /publication/ 26418245_INDIAN_EDUCATION_SYSTEM_A_COMPREHENSIVE_ANALYSIS_BY_SISTE R_kNIVEDITA)[3] has very rightly mentioned that true education means emphasising on essential elements for building the right educational path to reach the real objective of humanity. It is not just what we learn on going to school. When we simply go to school then college and get a degree.We are getting more educated but possibly we are not learning. When we learn when we grow ourselves totally in congruence with our surroundings is when we grow. What we are learning, how we are being taught those things and how we implement whatever we have learnt is what a good education system should involve.

We were still following the traditional method of teaching in the classroom in front of the students rather than upgrading to new methods of teaching. But when the pandemic struck the teachers had to move forcibly to online methods of teaching so that the process of learning for students doesn't stop. Around 20 years ago the concept of e-Learning was very new to the people and they were not ready to accept the change or accept the transformation from conventional to digital method of teaching and learning. But in the past 5-7 years and specially in the times of covid-19 a lot of people have switched to digital learning. Now digital learning is not only for kg—12 but it is also for college students, higher education and working professionals who plan to continuously hone their learning skills and gain knowledge. Digital education has given us the choice of choosing our own paths rather than moving

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[3] (https://www.researchgate.net /publication/ 26418245_INDIAN_EDUCATION_SYSTEM_A_COMPREHENSIVE_ANALYSIS_BY_SISTER_kNIVEDITA)

in the path already craved by society for us. There are various types of e learning methods in India:

- school level kg—12 then another is for the

- higher education from graduation until the phd or even higher education

- competitive exam section where different e-learning companies offer only competitive exams material for preparation to the students at a very low cost as compared to the offline coaching centres.

- professional courses which are the skill development courses

(http://www.aurumequity.com/the-online-education-industry-in-india-present-and-future/)[4]

Change is the only constant thing. E-Learning industry began 20 years ago but we need to understand the factors that were responsible for the growth of this industry.

There are few basic requirements for the digital learning process - first is the internet connectivity then second is the availability of a device. It can be a smartphone or any other device, for example personal computers that are PCs or laptops. Coupled with these two things factors the process of digital learning can be put into practicality by any student. The Indian government is trying to make the country connected to each other digitally which also means that the internet connectivity has increased many folds in India now in currently in this year 2020 as per the data of Aurum equity and there are 730 million internet users in India in 2020.

(http://www.aurumequity.com/the-online-education-industry-in-india-present-and-future/)[5]

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[4] (http://www.aurumequity.com/the-online-education-industry-in-india-present-and-future/)

[5] (http://www.aurumequity.com/the-online-education-industry-in-india-present-and-future/)

Education: Conventional to Digital
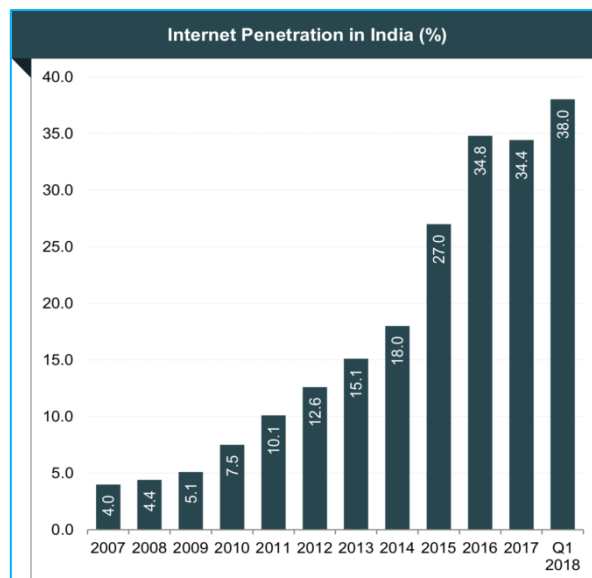
(Year wise Data of internet usage in India)

https://dot.gov.in/sites/default/files/statistical%20Bulletin-2018.pdf)[6]

In fact, India is second only to China and one of the biggest and fast-expanding markets for digital consumers. It had around 560 million internet users in 2018. On an average, the Indian mobile data users consume 8.3 gigabits (GB) of data in a month. While in China this number stands at 5.5 GBand somewhere in the range of 8.0 to 8.5 GB in South Korea.. Indians had 1.2 billion mobile phone subscriptions and had downloaded somewhere 12 billion apps in 2018. A study by McKinsey clearly states that out of 17 mature and emerging economies find that India is digitizing faster than any other country and there is plenty of room to grow. Just over 40 percent of the populace has an internet subscription.

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[6]https://dot.gov.in/sites/default/files/statistical%20Bulletin-2018.pdf)

Table 9 - Internet Subscribers in India (Millions) (2007-2018)

At the end of March	Total	Narrowband	Broadband	Wired	Wireless	Urban	Rural
2007	-	-	2.34	9.27	31.30	-	-
2008	-	-	3.87	11.09	65.50	-	-
2009	-	-	6.22	13.54	117.82	-	-
2010	-	7.41	8.77	16.18	177.87	-	-
2011	-	7.79	11.89	19.68	381.40	-	-
2012	-	5.70	13.81	19.51	-	-	-
2013	-	6.56	15.05	21.61	143.20	-	-
2014	251.59	190.72	60.87	18.50	233.09	-	-
2015	302.36	203.15	99.20	19.07	283.29	194.80	107.56
2016	342.65	192.90	149.75	20.44	322.21	230.71	111.94
2017	422.20	145.68	276.52	21.58	400.62	285.68	136.52
2018	493.96	81.35	412.60	21.24	472.72	348.13	145.83

Note: - Not Available

Source - TRAI

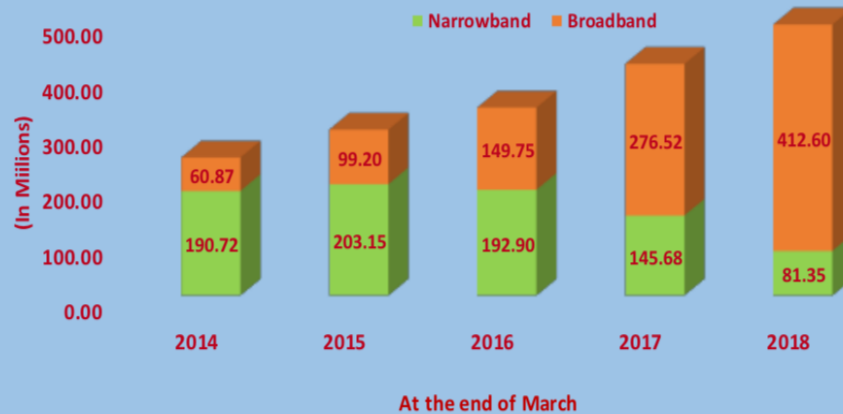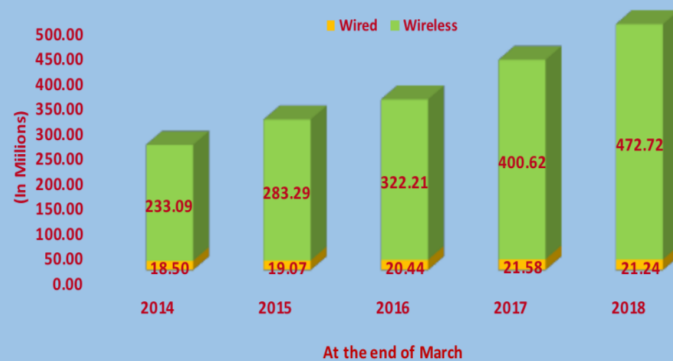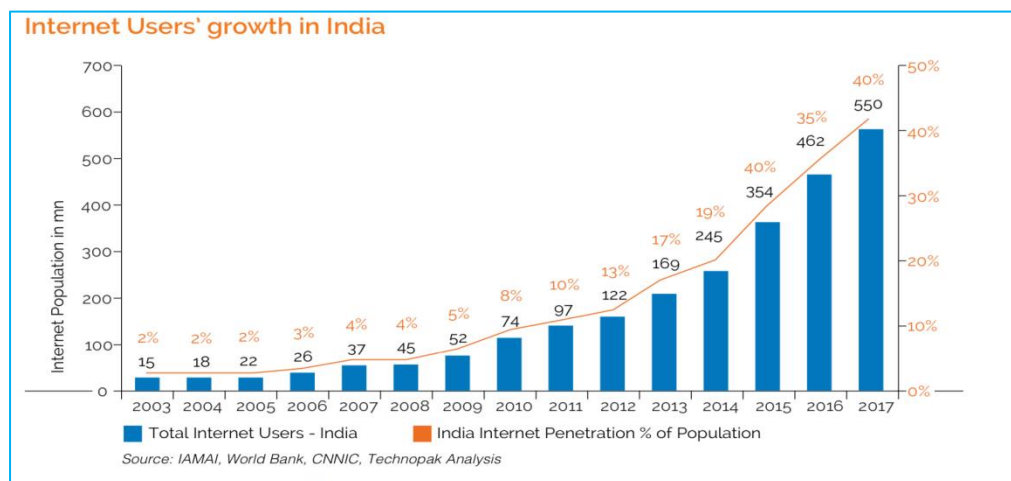### Fig 9A - Internet Subscribers - Narrowband & Broadband (in Millions)

Fig 9B - Internet Subscribers - Wired & Wireless (in Millions)

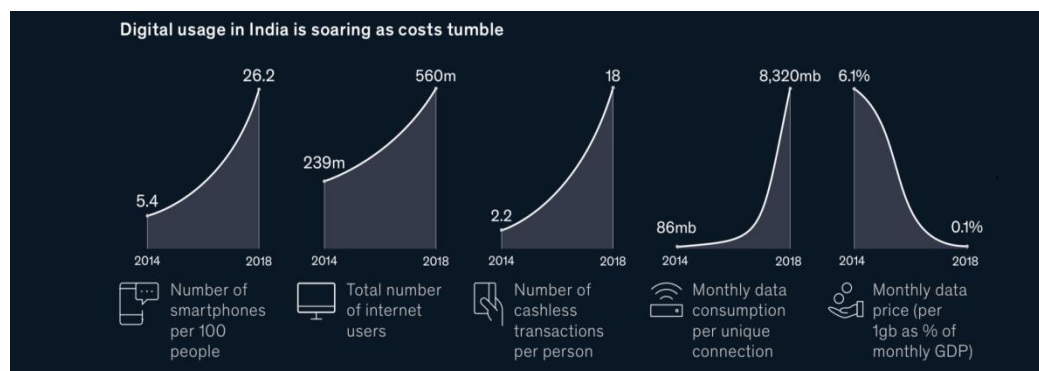https://dot.gov.in/sites/default/files/statistical%20Bulletin-2018.pdf[7]

Source : IAMAI, world Bank, CNNIC Technopak Analysis [8]

https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20India%20Technology%20to%20transform%20a%20connected%20nation/MGI-Digital-India-Report-April-2019.pdf[9]

Moreover, It was estimated that by 2023, there would be over 650 million internet users the country. Despite the large base of internet users, the internet penetration rate in the country stood at around 50 percent in 2020.

(https://www.statista.com/topics/2157/internet-usage-in-india/)[10]

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[7] https://dot.gov.in/sites/default/files/statistical%20Bulletin-2018.pdf

[8] Source : IAMAI, world Bank, CNNIC Technopak Analysis

[9] https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20India%20Technology%20to%20transform%20a%20connected%20nation/MGI-Digital-India-Report-April-2019.pdf

[10] Literacy rate at 71% in rural India, 86% in urban: Survey, DNA, 30 June 2015

In fact, Telephone Regulatory Authority of India (TRAI) in its reports also suggest that there are more than 108 Crore mobile phones in India with teledensity in urban areas pegged at 166.64%.

https://www.ibef.org/download/Ecommerce Report July 2018.pdf[11]

Table 2 – number of landline and mobile subscribers (2001 to 2018)

At the end of March	No. of Mobile phone subscribers (in million)
2001	3.58
2002	6.68
2003	13.29
2004	32.65
2005	56.95
2006	101.87
2007	165.09
2008	261.08
2009	391.76
2010	584.32
2011	811.6
2012	919.18
2013	867.81
2014	904.52
2015	969.54
2016	1034.11
2017	1170.59
2018	1188.99

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[11]India to see severe shortage of jobs in the next 35 years, Live Mint, 28 April 2016

Source - DOT (Compiled Data)

Fig 2 - Number of Landline and Mobile subscribers
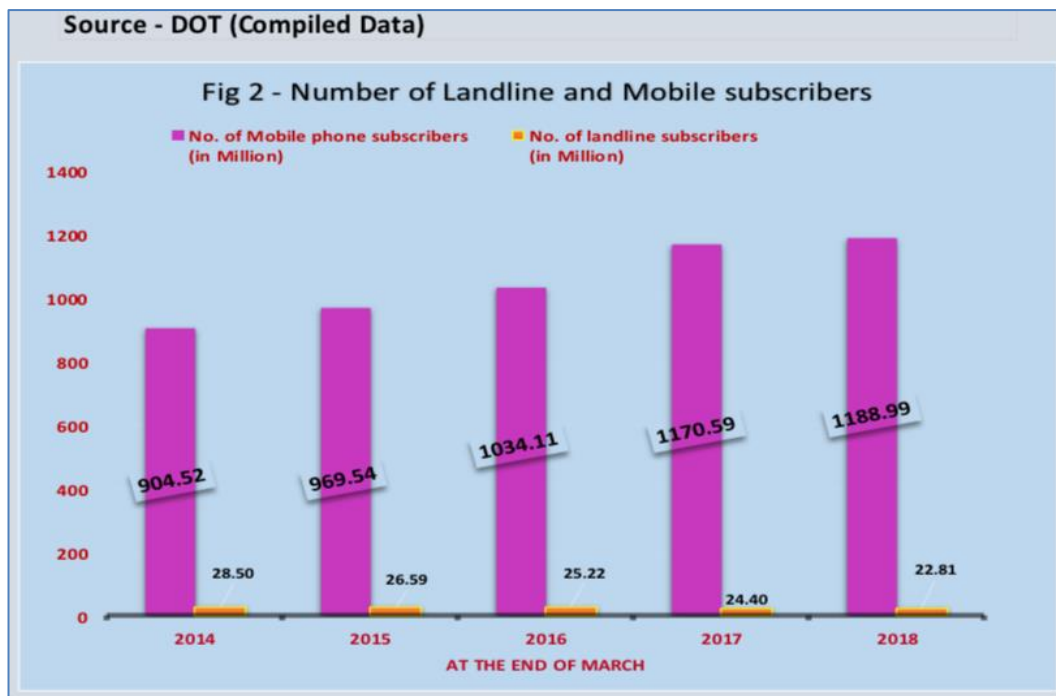
https://dot.gov.in/sites/default/files/statistical%20Bulletin-2018.pdf[12]
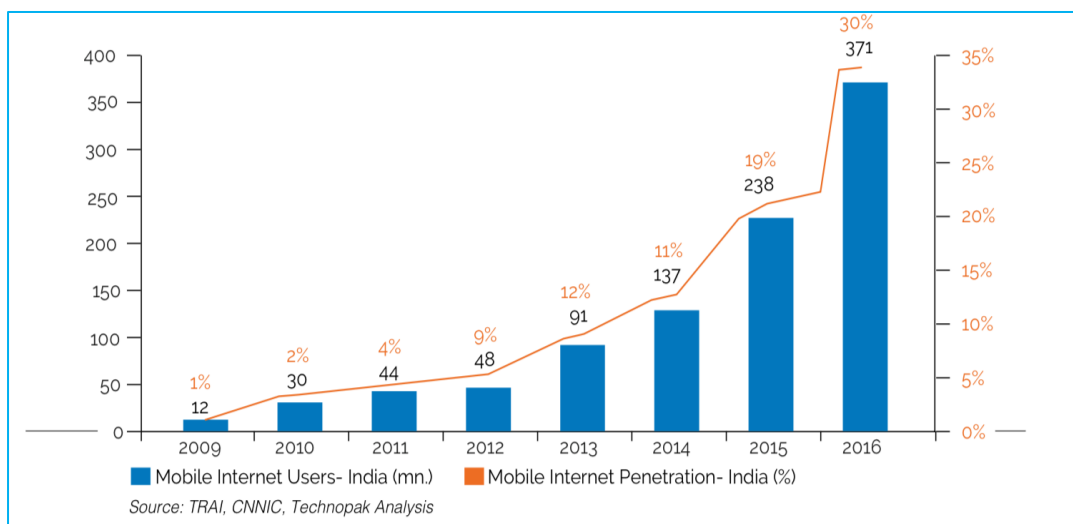
Source TRAI. CNNIC, Technopak Analysis [13]

This clearly shows that India has sufficient infrastructure to shift the education pattern from traditional book based model to the online based model.

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[12]Highest unemployment rate in India in 5 years: Govt. Survey, Financial Express, 1 October 2016

[13]Source TRAI. CNNIC, Technopak Analysis

2.   Conventional Education in India

Conventional education is also referred as the long-established learning customs that society traditionally use in schools.

Some of forms of education reform promote the adoption of progressive education practices, a more holistic approach which focuses on individual students' needs and self-control. In the eyes of reformers, This system of Education is primarily traditional teacher-centered method focused on rote learning and memorization that emphasise on task-based approaches to learning.

Education Researcher Robert H Beck in his paper *The Three R's Plus: What Today's Schools Are Trying to Do-And Why***https://www.journals. uchicago.edu /doi/abs /10.1086/459539**[14]has emphasized that traditional education is simply a process to transmit knowledge to a next generation which may include those skills, facts, and standards of moral and social conduct that adults consider to be necessary for the next generation's material and social success. This process is simply imposed from someone else who happens to be their teachers. Students are expected to obediently and docilely accept the answers and believe them. Teachers are the instruments by which this knowledge is communicated and these standards of behavior are enforced.

When we study the past, the methods of the primary educational technique we very traditional. It involved education through simple oral recitation. Students typically sat quietly at their seats and listened to the teachers one after another. All students are called one by one until all students have been called upon. The primary activity of teacher's was to assign and listen to the recitations of the students. The students would study at their home by memorizing and completing the assignments at home.

2.1 Conventional Education and Education System in Institutions

From ancient times India has followed the method of learning which was also the Gurukul system of learning where a group of students are taught by one teacher who specializes in his or her own subject. The role of the teacher was that of an instructor. The role of the instructor is to transmit the
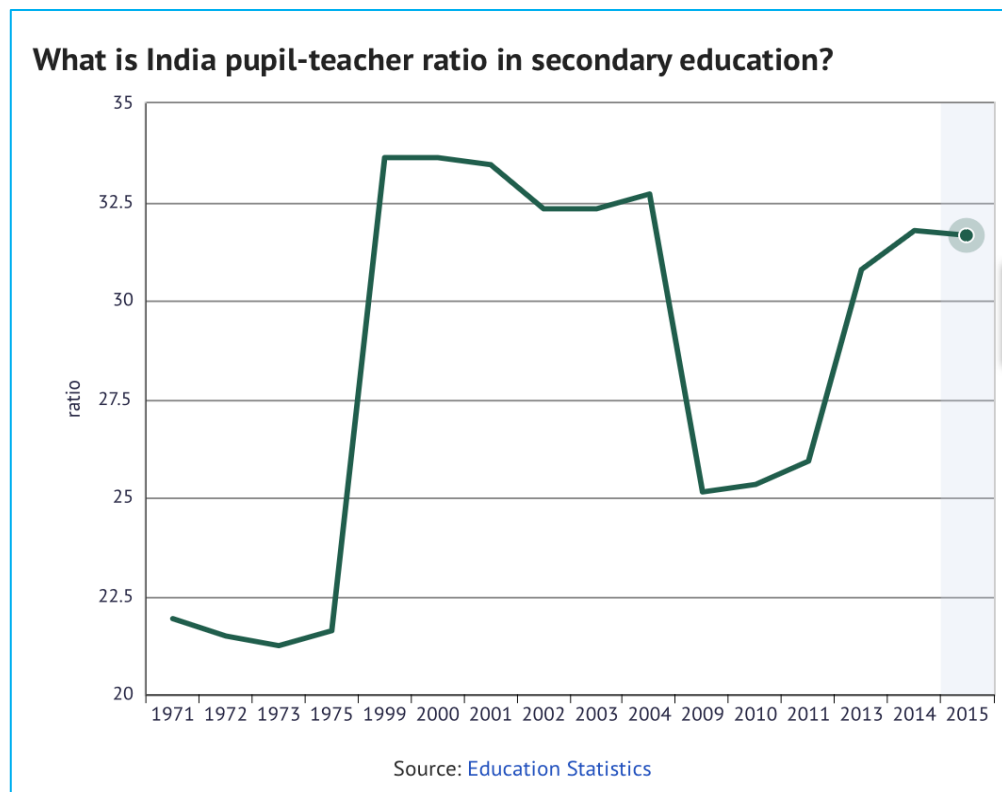
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[14]**https://www.journals. uchicago.edu /doi/abs /10.1086/459539**

information in a suitable manner to the group of students so that the students are able to understand the information. The students then need to understand the concept and memorize it. The teacher centric approach of teaching is a one way communication, where the basic idea is to recite the information in the class, the students then memorize the information and appear for their exams.

Over the period of time a lot of private institutions opened with the sole interest of earning more and more profit. In order to earn more profits more students were stuffed in a classroom. This caused an imbalance in the teacher pupil ratio. According to a research Published by Statista Research Department, Oct 16, 2020

(https://www.statista.com/statistics/603889/pupil-teacher-ratio-in-india-by-school-type/)[15]

In 2017, India had about 32 pupils per teacher in primary education institutions across the country. This ratio was much lower for tertiary education students at about 24 students for each teacher.

What is India pupil-teacher ratio in secondary education?

Source: Education Statistics

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[15] (https://www.statista.com/statistics/603889/pupil-teacher-ratio-in-india-by-school-type/)

(https://knoema.com/atlas/India/Pupil-teacher-ratio-in-secondary-education)[16]

In the conventional method of teaching we presume that every student has the same pace of learning and that every student is able to understand what is being delivered by the teacher. It is more of a one way mode of communication. When it comes to addressing the doubts of the students, it was found that not all students have the confidence of getting up and sharing their pain points with the teacher in the classroom. There are two pronged problems - one is that the teacher has not been able to build up the confidence for himself in the minds of the student, second is, that the student has an inferiority complex that he has not been able to understand what was instructed while the others did.

Another issue of the conventional method of teaching is that whatever is taught in the school throughout the year or throughout the semester, the student is supposed to learn all of it for the exams, when only questions from a few chapters are asked.

We can now find a connection being established here when teacher delivers a set of information in the class

- Situation 1. if the student is able to understand, well and good.

- Situation 2. if the student is not able to understand then he would be able to perform well in the exam too.

We do not judge the capability of the student on the basis of the knowledge he or she has rather we judge the student on the basis of grades the student gets. As academicians we need to start focusing on the capability and growth of the student rather than what marks the students get. Even the teachers are being held responsible for the kind of performance the student. (https://www.schoolnet.org.za/gettingstarted/01/M1_Act3_reading1.htm)[17]

In most government schools when a good number of students are not able to perform well in the exams then sometimes the

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[16] (https://knoema.com/atlas/India/Pupil-teacher-ratio-in-secondary-education)

[17] (https://www.schoolnet.org.za /gettingstarted/01/M1_Act3_reading1.htm)

promotion or the salary increment of the teacher is withheld.

This increases the pressure not just on the students but also on the teachers who get pounded by work load as majority of the private schools maintain a ratio of one subject teacher on 55 students. This punishing schedule soaks out creativity, intellect and innovation from teachers.

Education System in Institutions

There are five formal institutions of getting education in India through conventional system:

1. Kindergarten Schools or Pre-Primary schools

2. Primary to Secondary Schools

3. Graduation Colleges

4. Doctorate Institutions

5. Institutions providing Professional Courses

The first two institutions infuse discipline and routine in a child's life and provides him with basic knowledge of Languages, Science, Mathematics, History and Geography. When a student visits a school, he gets to knows that he will be taught a certain subject at a particular time by an assigned teacher. Student's body and mind gets acclimated with this procedure. This brings in discipline and patience that further improves efficiency and grasping skills of a student.

Students get detailed knowledge of the chosen subjects once he reaches a college level as he gets exposed to detailed nuances of the subjects & gets guidance from highly qualified and trained academicians, researchers and scholars. While in Doctorate institutions student gets an opportunity to take research as subject by himself and explore various quarters so that he can discover or invent various new techniques and philosophies to take this world to a new horizon.

As per the Annual Status of Education Report (ASER) 2012, http://img.asercentre.org/docs/Support%20ASER/fund_raising_d

ocument_-_4_august_2012MAIL.pdf[18]96.5% of all rural children between the ages of 6-14 were enrolled in school as India had maintained an average enrolment ratio of 95% for students in this age group from year 2007 to 2014. As an outcome the number of students in the age group 6-14 who are not enrolled in school has come down to 2.8% in the year academic year 2018 (ASER 2018). https://img.asercentre.org/docs/ASER%202018/Release%20Materi al/aserreport2018.pdf[19]There were 229 million students enrolled in different accredited urban and rural schools of India, from Class I to XII, representing an increase of 2.3 million students in total enrollment in the year 2002, and girl's enrollment increased by 19%. Quantitatively India is moving closer to universal education. The quality of India's education has been questioned specially the quality of government run schools.

While more than 95 % of children go to primary schools, only 40 % of Indian adolescents attend secondary schools forgrades 9-12. Since 2000, the World Bank has committed over 2 billion USD to education in India. Some of the reasons for the poor quality include absence of around 25% of teachers every day. Governments of Indian states have introducedregularentrancetests and educational assessments to identify and improve such schools.

2.2 Evolution of Teaching Methods & Smart Classes in schools

The methods of teaching have evolved over the years and the scenario of teaching has gone through revolutionary changes in last few years. As the requirements of people are changing, the education system also has to change. Earlier, the basic aim behind educating a child was to make him capable of meeting his basic needs. With the passing time, things and services which were considered as luxury at that time have now become a part of our basic needs. And as the needs of population grew, education system had to evolve had it not been so, it would have been very difficult to fulfill the needs of today.

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[18]http://img.asercentre.org/docs/Support%20ASER/fund_raising_document_-_4_august_2012MAIL.pdf

[19]https://img.asercentre.org/docs/ASER%202018/Release%20Material/aserreport2018.pdf

Thus, teachings methods have evolved during the time to make it better and more engaging for students. The new teaching modules are made simple, consistent, and are continuously evolved by the core management group based on the hands-on skill in the school backdrop. Teachers are trained in a specialized atmosphere so that they can become councilors in the   way they want. The programcan be considered as successful as the teachers have been linked to the school system. The complete end to end training given to the teachers for counselling is supervised by the school management. Thus, it would not be wrong to say that only when a teacher is motivated that he/she can help a child perform effectively, making him a better personality.

The basic motive of a child-centered education system is to inculcate and enable optimal development of a child's personality. And make sure that the competencies being developed are in line with their individual needs and requirements. Based on thechild's inquisitiveness, interests and learning capabilities, the teaching methods should be adopted. It should support the self-educational process of the child, specially by supporting their own senses of self organisation and responsibility.

In order to reach this goal, learning methods are shaped both by the adult (teacher or parent) and the child, and are adapted in accordance with the child's individual learning requirements. This necessitates a learning environment with with two main features, one which ischaracterised by mutual trust and another capable of enabling independent as well as cooperative learning.

Education is the most critical segment for the development for socio-political structure of India. A skilled workforce coupled with the latest technique is the key to growth in the modern and highly competitive world. There has been a slow but steady transition from the traditional and rote mode of teaching methods. Several scholars around the world have been supporting this infusion of technology in the educational sector.

Teachers are the facilitators of knowledge while the students are at the receiving end. Until now a teacher centric methods were used which involved one way

communication, memorising and revering the information and judging students on the basis of marks. The teacher has to focus on more than 30, sometimes even more than 50 students at a time, so the students' level of understanding and pace of learning is not given much importance.

Innovation is the most important thing lacking in this method of teaching. The shortcomings in the traditional teaching methods are now filled up by the offerings of the smart classroom systems.

The private schools were the ones to adopt the smart classroom system first followed by the state and central governments. Now the central and state governments are allocating huge funds for the setting up of smart schools. The technology being offered does not intend to replace the lecture delivery method in the classrooms, rather the purpose is to support their teaching with videos, audios, PowerPoint presentations so that the students' interest is maintained throughout the lecture.

Features of a Smart Classroom

Source: Research Nester
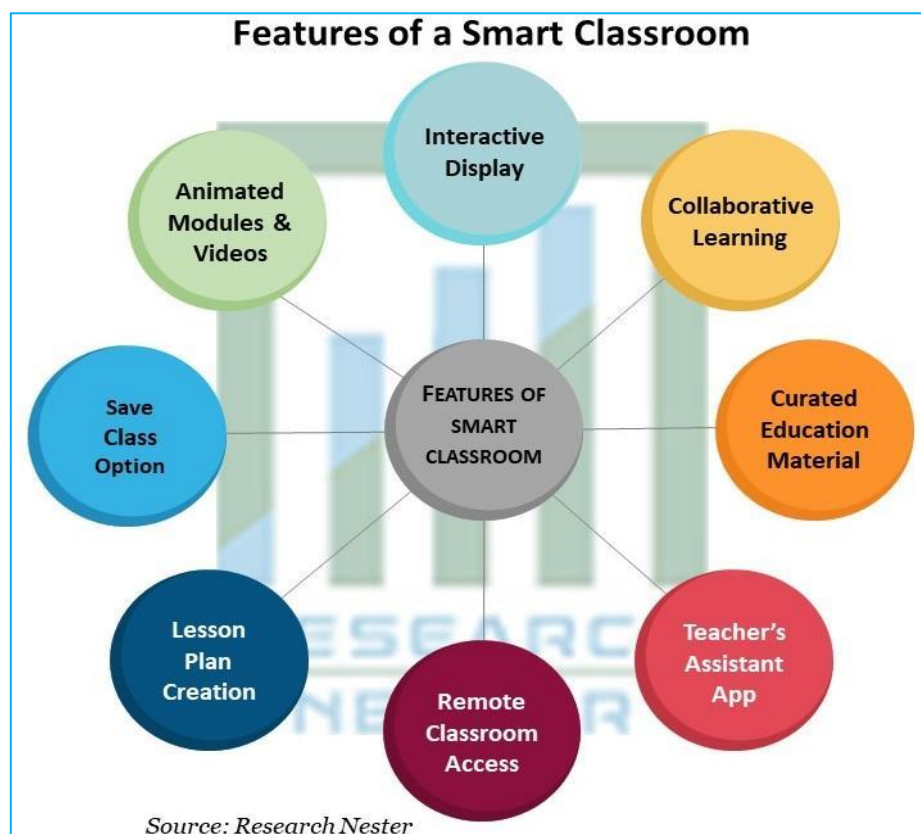
Source : Research Nester [20]

[20]Source : Research Nester

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Technology can be considered as a driver of two things –

a. increasing the students' attention to the concept and

b. making teachers proactive.

An independent study by Eugene Research Institute reveals that 5th% graders who participate in smart classroom are 60% more likely to reach state reading benchmarks than those who do not participate. According to Lincoln(1992) without the images to create meaning in the words, children will not read. Glasser (2001) states that children only understand 10% of what is read but 80% of what is experienced. It can be improved by giving students the opportunities to work with or experience the reading passage. (Smart Classroom in Indian Education Scenario Education Essay, 1970)[21]

The devices being used in the smart classes can be divided into hardware, software and the service.

Hardware components are - projector, digital interactive board, sound system, remote, charger, etc.

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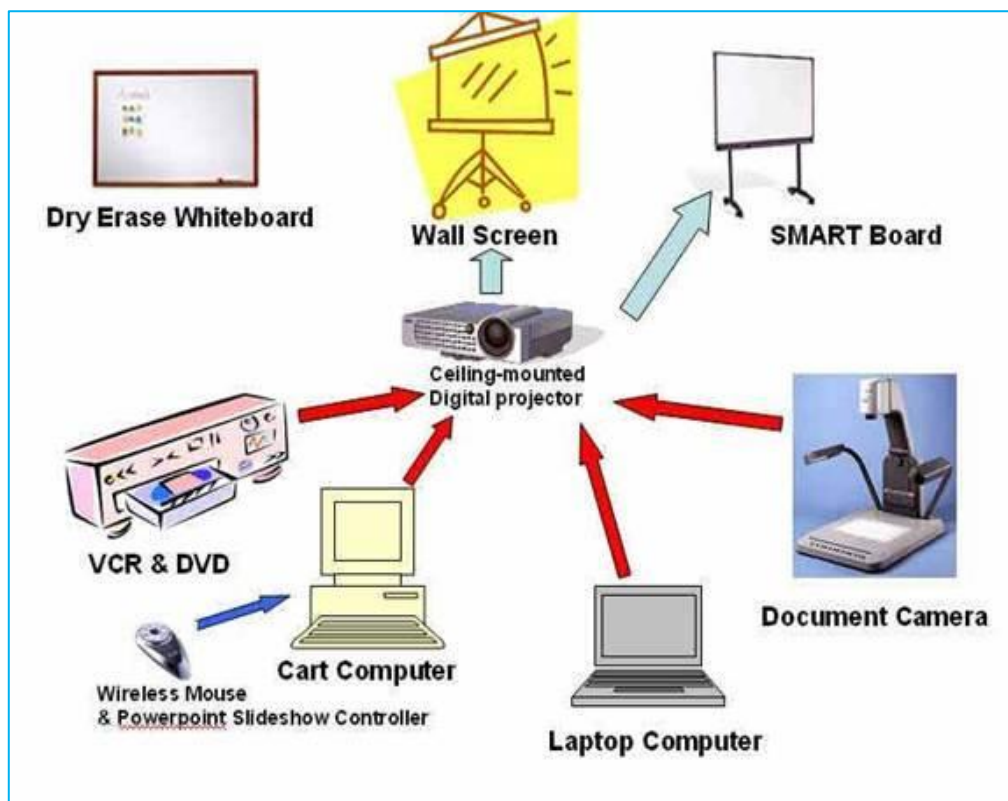
[21] (Smart Classroom in Indian Education Scenario Education Essay, 1970)

(THE CONCEPT OF SMART CLASSROOM, 2016 by Dr.V.K.Maheshwari)
http://www.vkmaheshwari.com/WP/?p=2352[22]

Software is the technology being used in the smart class. It might also include the content available for teaching. According to a report published in the Fortune Business Insights *the Software as a Service (SaaS) is vowing tremendously and will supersede the hardwire market very soon. SaaS infrastructure offers a robust, flexible, personalised and easy to access learning model.* (https://www.fortunebusinessinsights.com/industry-reports/smart-education-and-learning-market-101942)[23]

Services include the support being offered by the organisations.

Many schools have already adopted the smart system of teaching. According to a report published (Smart Classroom Market in India 2016-2020 ID: 3802160) on researchandmarkets.com the market size is said to grow at the rate of 23.4% from 2016 to 2023. A report on Global Newswire said that *according to reliable estimates, the global EdTech and smart classroom market reached a valuation of USD 73.9 billion in the year 2019 and is predicted to expand with a CAGR of 16.1% during 2020-2027.* https://www.globenewswire.com/news-release/2020/11/05/2120799/0/en/Global-EdTech-and-smart-classroom-market-size-to-witness-16-1-CAGR-through-2027.html[24]

Key players of the smart class segments

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[22] (THE CONCEPT OF SMART CLASSROOM, 2016 by Dr.V.K.Maheshwari)
http://www.vkmaheshwari.com/WP/?p=2352
[23] (https://www.fortunebusinessinsights.com/industry-reports/smart-education-and-learning-market-101942)
[24] https://www.globenewswire.com/news-release/2020/11/05/2120799/0/en/Global-EdTech-and-smart-classroom-market-size-to-witness-16-1-CAGR-through-2027.html
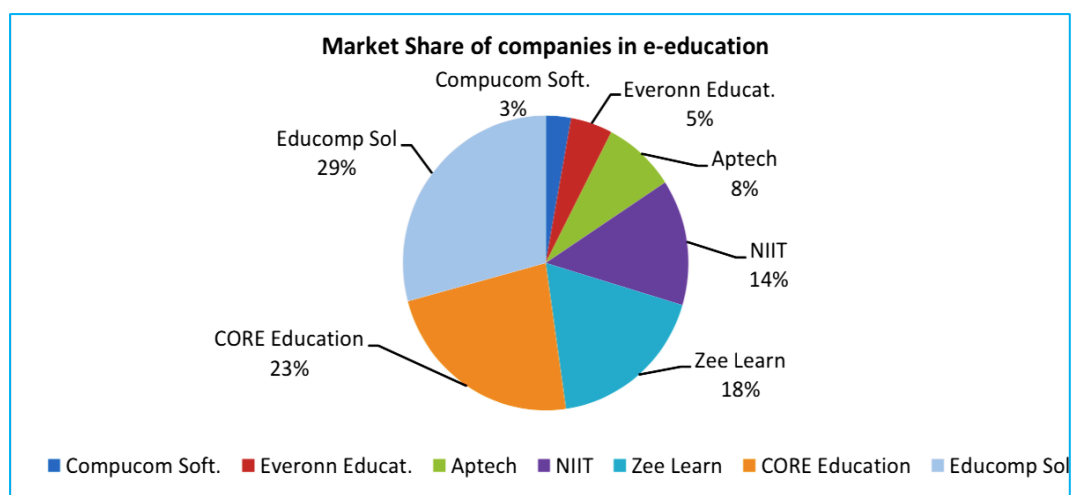
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Market Share of companies in e-education

- Compucom Soft. 3%
- Everonn Educat. 5%
- Aptech 8%
- NIIT 14%
- Zee Learn 18%
- CORE Education 23%
- Educomp Sol 29%

Legend: ■ Compucom Soft. ■ Everonn Educat. ■ Aptech ■ NIIT ■ Zee Learn ■ CORE Education ■ Educomp Sol

(https://www.gjimt.ac.in/wp-content/uploads/2018/03/Dr.-Sneha-Sharma.pdf)[25]

With the progress in the content creation technology and availability of online content, the ratio of digital content in the curriculum has increased. Educomp Solutions and Core Education are the top providers of content in India. Video lectures and simulation techniques are also boosting market growth.
https://www.researchandmarkets.com/reports/3802160/smart-classroom-market-in-india-2016-202[26]

Objective of Smart Class Room:
http://www.vkmaheshwari.com/WP/?p=2352[27]

- Help teachers meet new challenges and developing students' abilities and performance.

- Pedagogically sound and visually rich curriculum resources.

- To makes abstract concept real and understandable.

- To have interactive and live teaching to elaborate and compare different objects and perceptions towards the particular concepts

- To makes learning an enjoyable experience for students. Activities and games to make learning process easy.

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[25] (https://www.gjimt.ac.in/wp-content/uploads/2018/03/Dr.-Sneha-Sharma.pdf)
[26] https://www.researchandmarkets.com/reports/3802160/smart-classroom-market-in-india-2016-202
[27] http://www.vkmaheshwari.com/WP/?p=2352

- To make effective blending of technology with the classroom

- To instruct simultaneously remote and local students.

- To improve creative thinking in learning process to visualize the concepts and practices with model and demonstrations.

- To optimize the use of e-resources wise e-books, e-journals, protocols, lecture notes, documentaries and so on.

- To customized content as per the school's scheme of work and to provide facility to update the content.

Smart class is the future: The amazing tools that the teachers get to explore allows them to dedicate more quality time to the students. They can focus on inducing the student's interest in the concept.

Fusion of conventional and modern method of teaching: Going to school develops a discipline in the students. They are able to interact with their fellow students, and become confident to speak in front of faculty members alike.

Become friendly with technological changes: Students are able to understand that technology is not a baggage but a part and parcel of their life. They become habitual to working on devices and latest software which is the need of the hour.

https://www.myeducomm.com/blog/concept-smart-classroom-transforming-indias-education-system/[28]

Some of the advantages and disadvantages of smart classes with Indian context are given below:

- Improves the interaction of student and teacher.

- Real-time blended teaching and learning
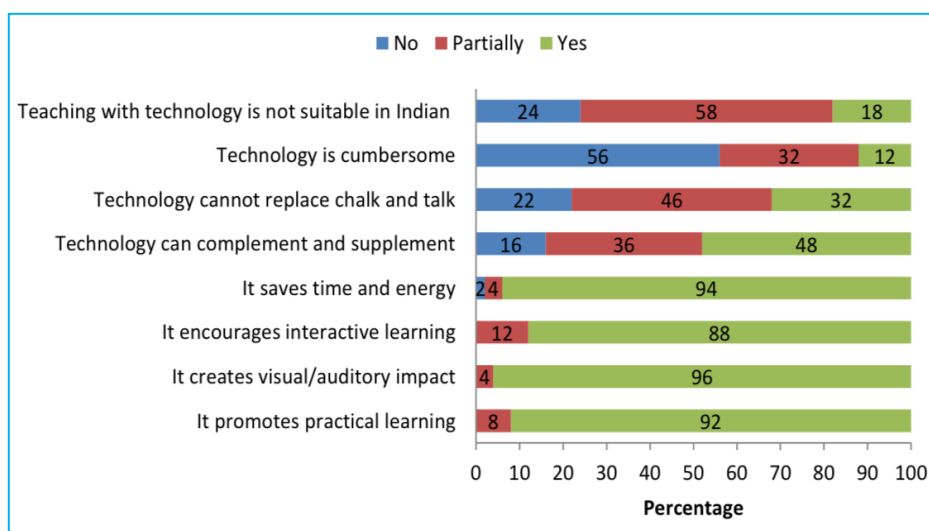
- Gives students a better understanding of concepts

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[28] https://www.myeducomm.com/blog/concept-smart-classroom-transforming-indias-education-system/

Education: Conventional to Digital

- Introduces students and instructors to education technology

- Improves visualization and creativity

- Provides students a better in-classroom experience

- Encourages e-learning and Virtual Classroom

- Improves academic performance of students thereby enhancing their mental and physical development

- Online web-based learning

- Student tend to learn at their own phase

- Easy-to-use and accessibility

Disadvantages of Smart Classes:

- Creating presentations, videos and programs are difficult

- Expensive and complex to implement

- High maintenance costs

- Devices such as computers, digital boards, etc. are fragile and not easy to operate

- Highly dependent on electricity

- Requires proper network connectivity such as LAN, WAN, Internet, etc.

	No	Partially	Yes
Teaching with technology is not suitable in Indian	24	58	18
Technology is cumbersome	56	32	12
Technology cannot replace chalk and talk	22	46	32
Technology can complement and supplement	16	36	48
It saves time and energy		24	94
It encourages interactive learning		12	88
It creates visual/auditory impact		4	96
It promotes practical learning		8	92

Percentage

(http://niti.gov.in/sites/default/files/2019-06/Final%20Report%20of%20 the%20Research%20Study%20on%20%20Use%20of%20Information%20an d%20Communication%20Technology%20in%20Secondary%20Schools%20 conducted%20by%20Education%20Quality%20Foundation%20of%20Ind ia_New%20Delhi.pdf)[29]

Role of Government in Promoting Smartclass technology:

Since the Constitutional Amendment, 1976 education has been a part of the concurrent List. This meant that education was now not just the sole responsibility of the state government but a shared responsibility between the Union Government and the States. After this the Union Government took up the responsibility of giving a national character of education, maintaining quality and standard including those of the teaching profession at all levels, and the study and monitoring of the educational requirements of the country. http://164.100.47.193/Refinput/New_Reference_Notes/English/F inalGovernmentSchemesforSchoolEducation.pdf[30]

S.No.	Activities	Programmatic Norms	Financial Norms (The Central share under the Scheme will be restricted as per the prevalent fund sharing pattern based on the financial norms given herein)
			g) Up to @ Rs. Rs.10,000/- Senior Secondary school only (class 11 to 12th).

[29] (http://niti.gov.in/sites/default/files/2019-06/Final%20Report%20of%20 the%20Research%20Study%20on%20%20Use%20of%20Information%20and%20Communication%20Technol ogy%20in%20Secondary%20Schools%20conducted%20by%20Education%20Quality%20Foundation%20of %20India_New%20Delhi.pdf)

[30] http://164.100.47.193/Refinput/New_Reference_Notes/English/FinalGovernmentSchemesforSc hoolEducation.pdf

S.No.	Activities	Programmatic Norms	Financial Norms (The Central share under the Scheme will be restricted as per the prevalent fund sharing pattern based on the financial norms given herein)
			h) Up to @ Rs. 20,000/- for composite Senior Secondary school (class 1 to 12th). i) These grants will be available on an annual basis.
15	RastriyaAvishkarAbhiya n (RAA)	To promote Science and Maths learning at upper primary to Senior Secondary (for classes VI to XII) as per the guidelines of RAA	Depends upon the State specific proposal which would include Science and Maths kits, Science and Maths fair/exhibitions, capacity building of Science and Maths Teachers, exposure visits, mentoring by higher educational institutions etc.

https://samagra.education.gov.in/docs/Letter%20to%20States%20on%20new%20Scheme.pdf[31]

The Government of India has been encouraging the application of ICT in several ways. Ministry of Human Resource and Development has a specialised ICT School Scheme which extends support to the states .

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[31]https://samagra.education.gov.in/docs/Letter%20to%20States%20on%20new%20Scheme.pdf

1. to provide computer aided education in secondary and higher secondary schools,
2. to set up smart schools where use of technology is demonstrated,
3. capacity enhancement of teachers and 4. e-content development

As maybe seen in the figure below that there has been a consistent increase in the amount of support being provided by the Government of India. In the fiscal year 2011-12 the highest amount of funds that is INR 57,573 lakhs were released to the states for employing ICT in schools.
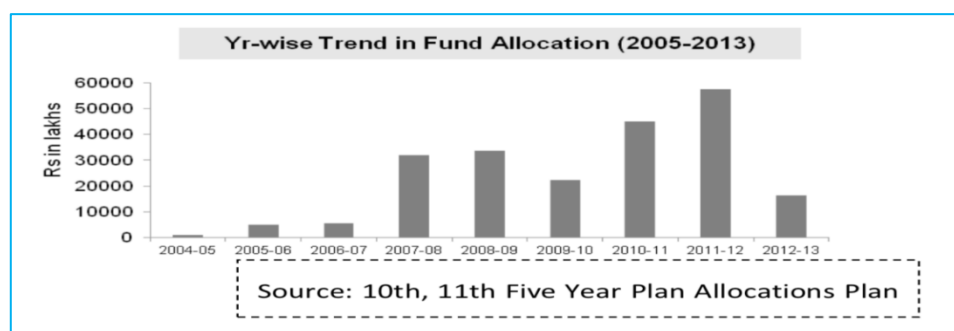
Source : 10th, 11th Five Year Plan Allocations plan[32]

A total fund of INR 2187 Crwasreleased. Given below in the pie chart are the top 10 states (Below figures are in Lacs). A large part of the fund releasedareusedfor paying the salaries of teachers.
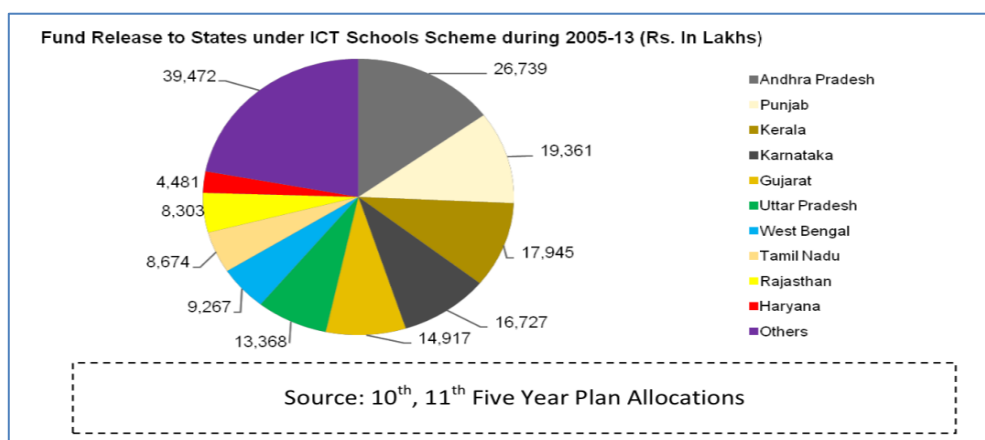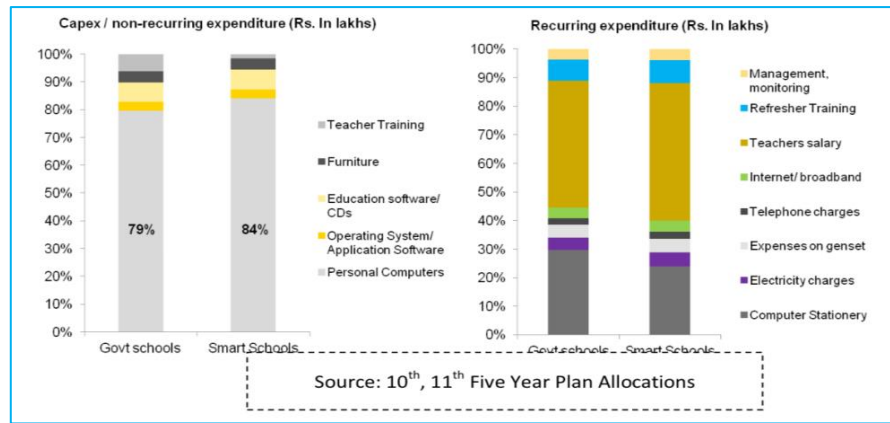

Source : 10th, 11th Five year Plan Allocations [33]

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[32]Source : 10th, 11th Five Year Plan Allocations plan
[33]Source : 10th, 11th Five year Plan Allocations

Source: 10th, 11th Five Year Plan Allocations

(https://www.education.gov.in/sites/upload_files/mhrd/files/
upload_document/Annexure%20V.pdf) [34]

Smart classes and mobile technology is not only changing education in highly-end private institutions but it is slowlypaving its way in the government aided schools set up in the rural and backward areas of the country.

2.3   Challenges in times of COVID-19

In country like India that already has poor human development index, Covid has devastated the school education system. The central and state governments have reduced expenditure on education consistently in last six years, that has forced the parents to spend more on their children's education.
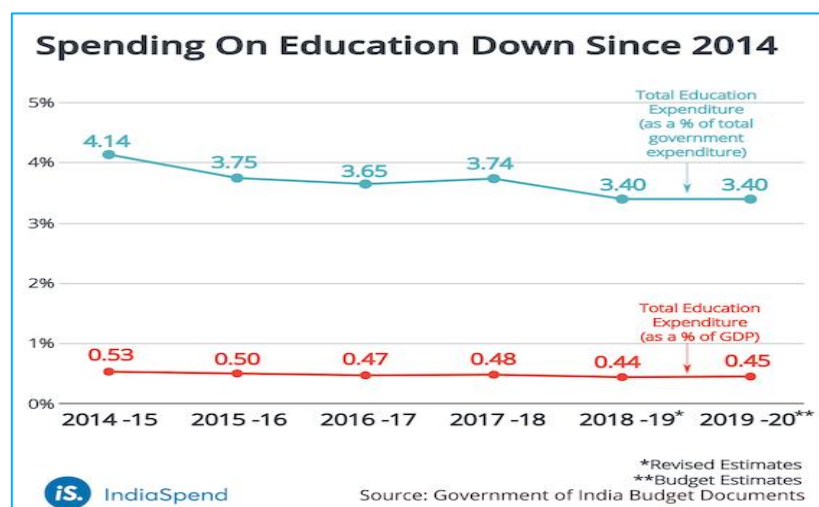
Source : Government of India Budget Documents [35]

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[34] (https://www.education.gov.in/sites/upload_files/mhrd/files/upload_document/Annexure%2
0V.pdf)

Reduced income of parents have forced almost 24 million children to drop out from their schools as they had to help their parents to make up for that lost income during the pandemic. This has forced the children back to labour in the unorganized sector.

The National Sample Survey Organizations' (NSSO) household survey of 2017-18 put forth the number of children who are out-of-school in India (6-17 years) at 3.22 crore. "*This will double in a year's time. With schools shut for nearly six months, we are already seeing children especially in rural areas helping their parents in MNREGA schemes. The longer the gap in learning, the more disinterested they get and eventually exit the education system. It's dangerous,*" said Niranjanaradhya, fellow and programme head, universalisation of education, National Law School of India University, Bengaluru.

https://www.livemint.com/news/business-of-life/out-of-school-children-likely-to-double-in-india-due-to-coronavirus-11597574633476.html[36]

In a survey conducted organized by Nobel laureate KailashSatyarthi for the NGOs which work for children, 85 % of the responding organizationsmentioned that the number of school drop-outs will possibly increase in the post-lockdown period.

With fallinthe monthly household incomes, expectations from children that they can contribute financially have intensified. A report says that more children can be forced to take up jobs to support their families.

Those children who are already working may need do so for longer hours or even work under deteriorating conditions.

Gender inequalities may further widen even within families when girls would be expected to perform multiple household tasks and agricultural work rather than attending school.

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[35]Source : Government of India Budget Documents
[36]https://www.livemint.com/news/business-of-life/out-of-school-children-likely-to-double-in-india-due-to-coronavirus-11597574633476.html

The report surveyed rural households that have school going children as part of the same project. The report says that 20 % of the respondent households that had school going childrenwerealmost ready to consider withdrawing their children from school due to the financial crunch and deny them their right to get educated.

https://www.thehindubusinessline.com/data-stories/data-focus/will-covid-19-lead-to-more-school-drop-outs/article33095912.ece[37]

With the closure of schools and educational institutions during the COVID 19 lockdown, around 1.72 billion learners have been affected across the globe. This number is staggering in India wherethe number is approximately 32 crore, resulting in high socio-economic costs for education stakeholders.
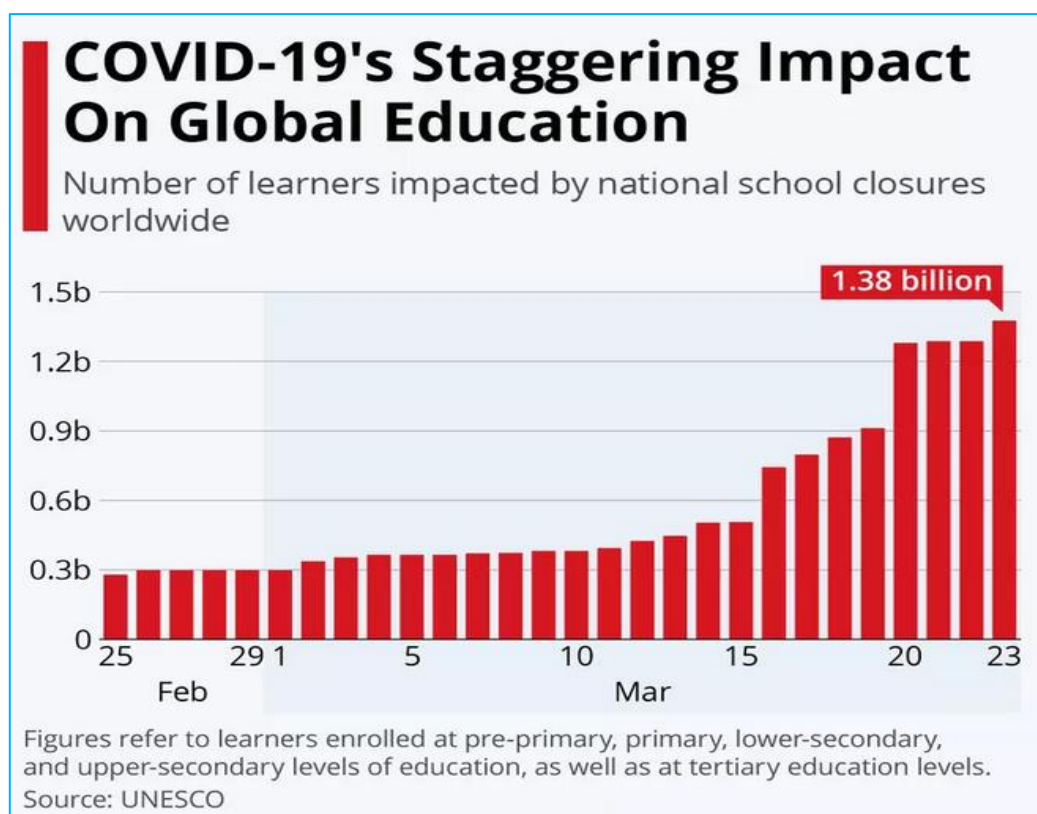
https://www.thehindu.com/education/multiple-education-challenges-for-students-teachers-and-parents/article32246834.ece[38]

During the Covid times, the governmentencouraged digital learning through various public and private initiatives such as DIKSHA and eVidya. However, the students who belonged to the less affluent families or were living in remote places had no mobile network and were left behind. As they could not bear the cost of digital devices, data plans, or network connectivity. This led to the broadening of the digital divide. State governments took ainitiative to bridge the gap for those children who are studying in government schools by developing user friendly apps, and broadcasting content on radio, Doordarshan or other regional TV channels.

The United Nations, in its report mentioned that more than one billion students worldwide were unable to attend school or university, due to the measures to stop the spread of Covid-19.

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[37]https://www.thehindubusinessline.com/data-stories/data-focus/will-covid-19-lead-to-more-school-drop-outs/article33095912.ece
[38]https://www.thehindu.com/education/multiple-education-challenges-for-students-teachers-and-parents/article32246834.ece

COVID-19's Staggering Impact On Global Education

Number of learners impacted by national school closures worldwide

1.38 billion

Figures refer to learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education, as well as at tertiary education levels.
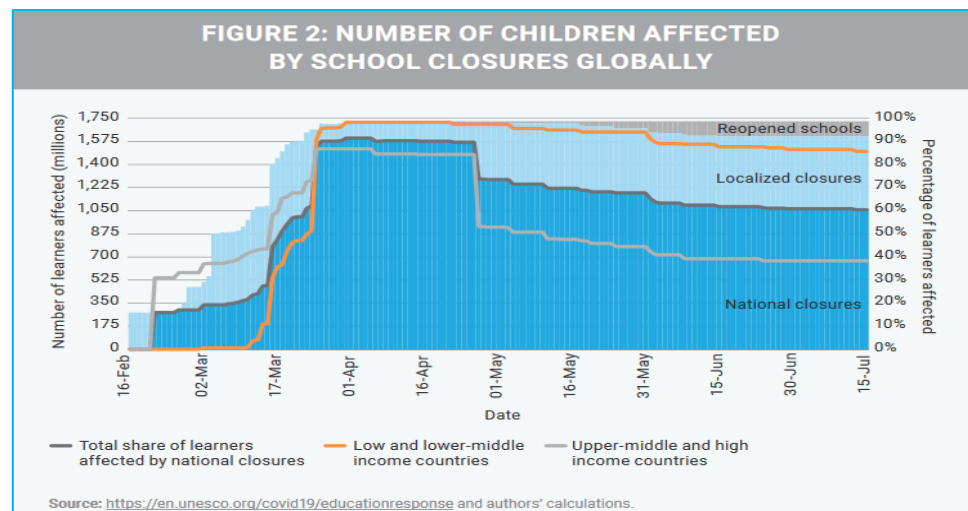Source: UNESCO

https://www.weforum.org/agenda/2020/03/infographic-covid19-coronavirus-impact-global-education-health-schools/[39]

UNESCO's figures refer to students enrolled at the pre-primary, primary, lower-secondary, higher-secondary and tertiary levels of education. It reported that 1,379,344,914 students or 80 % of the students at the world level were out of educational institutions due to the nation-wide lockdown.

United Nations has mentioned in the Policy Brief: *Education during Covid-19 and beyond*, that the global pandemic has caused the largest disruption of education ever in the history. This impact has been on the learners and teachers around the world, from pre-primary to secondary schools as well as technical and vocational education and training (TVET) institutions, universities, adult learning, and skills development establishments.
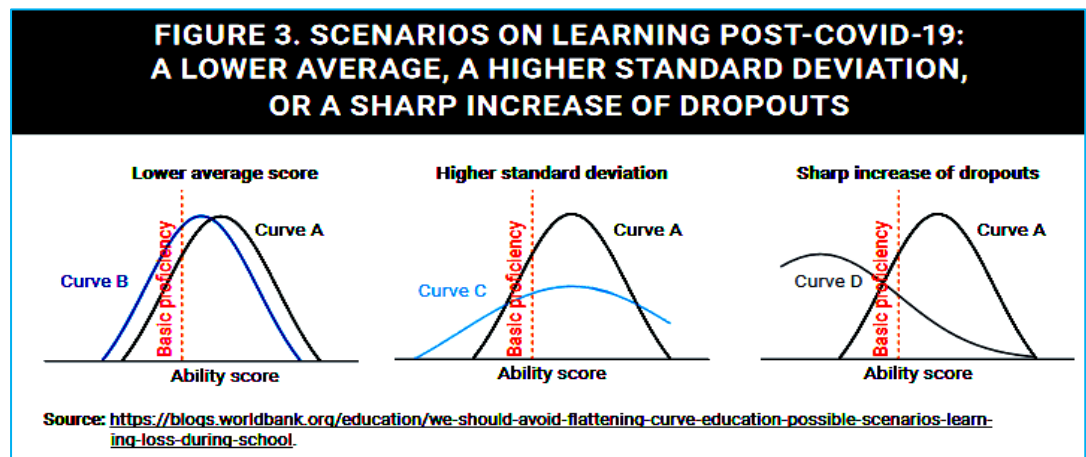
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[39] https://www.weforum.org/agenda/2020/03/infographic-covid19-coronavirus-impact-global-education-health-schools/

FIGURE 2: NUMBER OF CHILDREN AFFECTED BY SCHOOL CLOSURES GLOBALLY

Source : https//en.unesco.org/covid19/educationresponseand author's calculations[40]

The United Nations also said that in countries withvery high human development only 20% students have been out of school at the pre primary level as compared to 86% in countries with low human development. .

FIGURE 3. SCENARIOS ON LEARNING POST-COVID-19: A LOWER AVERAGE, A HIGHER STANDARD DEVIATION, OR A SHARP INCREASE OF DROPOUTS

https://blogs.worldbank.org/education/we-should-avoid-flattening-curve-education-possible-scenarios-team-ing-loss-during-school[41]

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[40]Source : https//en.unesco.org/covid19/educationrespose and author's calculations https://blogs.worldbank.org/education/we-should-avoid-flattening-curve-education-possible-scenarios-team-ing-loss-during-school

[41] https://blogs.worldbank.org/education/we-should-avoid-flattening-curve-education-possible-scenarios-team-ing-loss-during-school
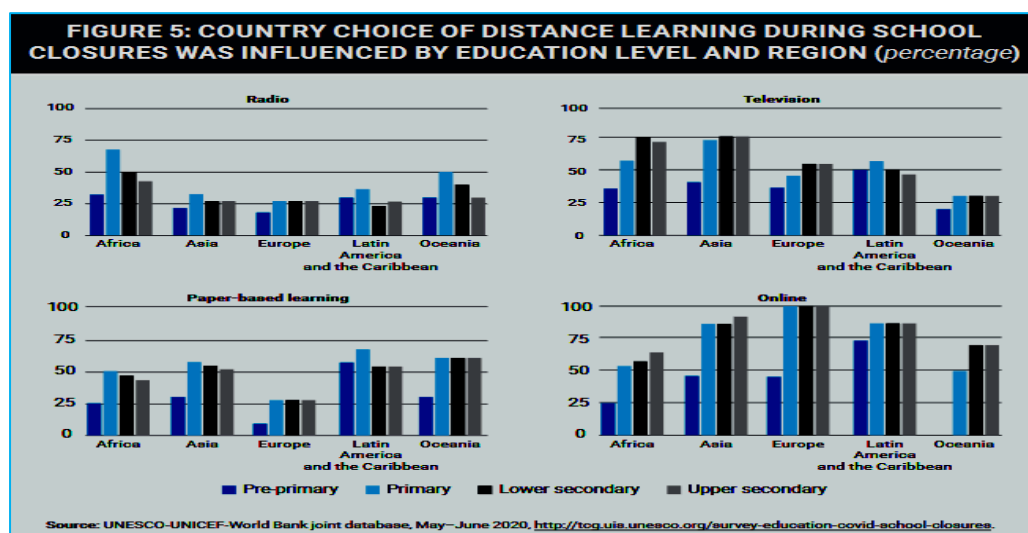
The World Bank identifies three possible reasons for the loss of learning: a.afall in average learning levels for all children,

b. a broadening of the distribution of learning achievements due to highly unequal effects of the crisis on various populations, or,

c. a significant increase of students with very low level of achievement due in part to massive dropouts.

This shows that 25 % more students can now fall below the level of baseline proficiency which is needed so that they can participateproductivelyand effectively in the society, for their future learning, as a result of school closures only.

Ensuring learning continuity during the time of school closures became a priority for governments the world over, many of which turned to ICT, requiring teachers to move to online delivery of lessons.

FIGURE 5: COUNTRY CHOICE OF DISTANCE LEARNING DURING SCHOOL CLOSURES WAS INFLUENCED BY EDUCATION LEVEL AND REGION (*percentage*)

Source: UNESCO-UNICEF-World Bank joint database, May–June 2020, http://tcg.uis.unesco.org/survey-education-covid-school-closures.

In areas with low connectivity, governments have used more traditional methods of distance learning, which is a mix of television and radio programming, as well as the distribution of printed materials. Although the monitoring being done by the countries is relatively low.

However, estimates indicate variable coverage:

a.distance learning in high income countries covers about 80–85 %

b.less than 50 % in low income countries

http://tcg.uis.unesco.org/survey-education-covid-school-closures/[42]

There is a huge digital divide between 2 groups of the society:

a.the disadvantaged have limited access to basic household services such as electricity

b. a lack of technology infrastructure

c. low levels of digital literacy among students, parents, and teachers.

https://www.unicef-irc.org/publications/pdf/IRB%202020-10%20CL.pdf[43]

School closures have necessitated changes in – and in some cases caused serious disruptions to – how students are evaluated.

https://en.unesco.org/sites/default/files/unesco_review_of_high-stakes_exams_and_assessments_during_covid-19_en.pdf[44]

In most countries, exams have been postponed; in a few, they have been cancelled; and, in others, they have been replaced by continuous assessments or alternative modalities, such as online testing for final exams.

No doubt, that the Covid-19 pandemic has unleashed the biggest calamity that humanity has faced so far. We are all undergoing perhaps the most difficult and trying circumstances of our generations. Education disruption impacts our readiness for the future and also has huge economic and lifestyle costs.

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[42]http://tcg.uis.unesco.org/survey-education-covid-school-closures/
[43]https://www.unicef-irc.org/publications/pdf/IRB%202020-10%20CL.pdf
[44]https://en.unesco.org/sites/default/files/unesco_review_of_high-stakes_exams_and_assessments_during_covid-19_en.pdf

3. Digital education in India

Technology has grown very swiftly in the past decade. With the improvement in the Information and Communication Technology (ICT) was accepted and absorbed in the education sector as well in the form of E-learning. Various scholars are of the opinion that E-learning is a method to facilitate the mode of distance learning. (https://files.eric.ed.gov/fulltext/EJ983277.pdf[45], Building an Inclusive Definition of E-learning: An Approach to the Conceptual Framework).

A researcher in his paper mentioned that E-Learning is a process of giving instructions to the students using the technology and tools. This is also to upgrade the traditional classroom teaching using technological skills with web-based components and learning environments where the educational process is experienced online. (https://dialnet.unirioja.es/descarga/articulo/4329720/2.pdf)[46]

E-learning is used to reach the maximum number of students with the help of electronic technology using the internet. It can also be done using extranet or over the intranet, via CD- ROM, interactive TV, or satellite broadcast (WAGNER, 2008). With the passage of time, the number of students has increased manifolds. Responsibility comes on the teachers to choose the best mode of teaching which holds the essence of imparting and delivering knowledge to the students.

The adoption of e-learning in India was moving at a slow but steady pace until the COVID 19 pandemic struck. Realising the great results that e-learning realises even the government of India has been taking many initiatives for achieving the target of taking education to every child. Although the chalk and talk method will never be replaced by e-learning but it has to be used in an efficient manner to cover up the loopholes of traditional teaching methods. Many institutions and parents are opening up to the idea of studying from the e-learning platforms.

According to the research by Marc Prensky's, results differ based on the different types of learning activities. He mentions learning

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[45] (https://files.eric.ed.gov/fulltext/EJ983277.pdf
[46] (https://dialnet.unirioja.es/descarga/articulo/4329720/2.pdf)

a)   behaviors through limitation, feedback and practice

b)   creatively through playing

c)   facts through association, drill, memory and questions

d)   language through imitation, practice and impression

e)   reasoning through puzzles, problems and examples [4].
      http://www.ijeeee.org/vol6/390-4E201.pdf [47]

A report presented by KPMG Online Education in India: 2021, mentioned that in the last two years, the growth of online searches was increased x2 times (twice) for education purposes and the searches through mobile devices grew by X3 (thrice) times. With the penetration of the internet in India, the rise in the e-learning industry has been significant. Technavio's market research predicts that the Indian online education market will grow at a CAGR of about 20% by 2020 which was worth about 18 billion U.S. dollars. According to the Online Education in India: 2021, by the year 2021, the online education industry in India will grow six times from 1.6 million users in 2016 to 9.6 million users by 2021 with a revenue of 1.96 billion U.S. dollars. At the global level, the number will swell to more than 243 billion U.S. dollars by 2022. (https://elearningindustry.com /how-elearning-landscape-evolving-with-growth-web-based-learning) [48]

Education can help us earn a worthy life of respect. It is one of the 4 most important factors that drive a society towards development - healthcare, education, agriculture and land. It is only through improving the educational condition of a society that the multi-faceted progress of its people can be guaranteed.

3.1   E-Learning in India

E-learning powered by digitisation is the best tool to achieve this goal. It is not a one way approach towards improvement of education practices but a versatile method.

The government of India marked 5 categories so that the benefits of e-learning can reap its fruit in each and every corner of the country. The categories are as follows:

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[47] [4] sing, P.P., & Sharma, s. (2005). *E-learning New Trends and innovations* (pp. 39). New Delhi: Deep and Deep Publications Pvt. Ltd.

[48] (https://elearningindustry.com /how-elearning-landscape-evolving-with-growth-web-based-learning)

Education: Conventional to Digital

- Elementary education - Classes 1 — 8

- Secondary education - Classes 9 — 12

- Higher education - Graduation — Till Ph.d

- Adult education - Focus is to spread literacy, awareness and functionality, also including information regarding healthcare, family life and vocational training.

- Technical and Vocational education - Technical and vocational education and training (TVET) comprises education, training and skills development relating to occupational fields, production, services and livelihoods.

The potential of e-learning is far fetched.

- connected students to information sources

- Giving and opportunity to people with a passion to teach from their home

- Quality of education has improved multiple times

- With more e-learning companies more jobs are being created not only in teaching but also in sales, administrations, Human Resource's, animations, etc. so many people are getting jobs.

- Students who have completed their education are using technology for opening their own business hence giving more jobs.

E-learning has improved the real time interaction level between teachers and students. The 3D animations supported with voice overs has increased the interest of students in the concepts. Colours attract their attention towards the screen. Not just for school education, but e-learning can now be used very effectively for education farmers about the best farming practices to be adopted. Animations can help them show and understand the techniques.

The E-learning industry began in India around 2 decades ago, but due to lack of awareness people could not realise its benefits. But over the period of time the e-learning industry has amplified multiple times.

According to a report by Business Wire, the online education market in India was valued at INR 39 billion in 2018 and is expected to reach INR 360.3 billion by the end of 2024, the industry is expanding at a compounded rate of approximately 43.85% during the 2019-2024 period.

In 2018, the **online primary and secondary supplemental education segment** was valued at INR 11.99 Bn which is expected to reach approximately INR 123.65 Bn by 2024, growing at an annual rate of ~46.48% during the 2019-2024 period.

The **online test preparation market** is expanding at a CAGR of ~50.84% during the 2019-2024 period and is expected to reach INR 94.75 Bn by 2024. This segment is expected to be the fastest-growing segment in the online education market.

The **online reskilling and certification market** is growing at a CAGR of ~36.95% during the 2019-2024 period and is expected to reach INR 93.81 Bn by 2024.

In 2018, the **online higher education market** was valued at INR 5.01 Bn. It is expected to reach INR 40.63 Bn by 2024 growing at a CAGR of ~40.74% during the five year period from 2019 to 2024. The conventional education system is insufficient for the growing population, and therefore students are switching to online higher education courses.

https://www.businesswire.com/news/home/20200417005258/en/Online-Education-Market-in-India-Worth-INR-360-Billion-by-2024-Exhibiting-a-CAGR-of-43---ResearchAndMarkets.com[49]

Factors responsible fo rather growth of e-learning industry:

- Students now give preference to ease of learning and flexibility.

- The change in consumer behavior towards detailed learning and surge in demand from tier II and tier III cities are driving the growth of the primary and secondary segment.

- The growth in career-focused population, enhanced Internet infrastructure and increased penetration of digital payment

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[49] https://www.businesswire.com/news/home/20200417005258/en/Online-Education-Market-in-India-Worth-INR-360-Billion-by-2024-Exhibiting-a-CAGR-of-43---ResearchAndMarkets.com

methods have caused the growth of the online test preparation segment.

- The growing business landscape has widened the skill gap among employees, which is why the demand for reskilling courses is picking up.

Other factors responsible for the growth of e-learning have been marked by KPMG in their report (https://assets.kpmg/content/dam/ kpmg/ in/ pdf/ 2017 /05/ Online -Education -in-India-2021.pdf)[50]

Young population - Around 60% of Indian population is from the age group 15—35 years. They are the major audience for e-learning products.

Cost of education - While the cost of school and coaching is soaring up the e-learning courses are available at very competitive prices due to the increase in competition.

Availability of quality education - E-learning has introduced students to an improved method of studying and teachers to a better way of teaching.

Employability quotient - E-learning has the potential to give jobs to numerous people in the various departments. Also it ha style ability to train the youth who are available for jobs in the market.

Government initiatives for online education - Government initiatives such as SWAYAM, E-Basta, RashtriyaMadhyamik Shiksha

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[50] (https://assets.kpmg/content/dam/ kpmg/ in/ pdf/ 2017 /05/ Online -Education -in-India-2021.pdf)

Abhiyan(RMSA), Skill India and Digital India will enable the infrastructure needed by students to study online

Internet penetration in India - There are around 431 million internet users in India. This number is expect3 to soar to 735 million by 2021.

Growing smartphone penetration - This has caused the acceptability of technological adoption amongst masses. There are around 300 Illinois smartphone users in India. By 2021, there will be more 180 million smartphone users in India.

Significant increase in disposable personal income -

• Disposableincomeofthecountryisexpectedtogrowby55percentby 2020

•

Indiawillkeepitscurrentrankastheworld's ssecondlargestmiddleclasstill 2030

https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf[51]

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[51]https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf

Table-6: Number of Recognized Institutions: 2015-16

	Type		Number
Number of Schools*	**Level-wise**	Primary	840546
		Upper Primary(in total)	429624
		Secondary(in total)	139539
		Senior Secondary(in total)	112637
		Total	**1522346**
	Management-wise	Government	1102783
		Government Aided	83787
		Private Unaided	335776
		Total	**1522346**
Number of Institutions in Higher Education	**University**	Central University	43
		State Public University	329
		Deemed University	122
		State Private University	197
		Central Open University	1
		State Open University	13
		Institution of National Importance	75
		State Private Open University	1
		Institutions under State Legislature Act	5
		Others	13
		Total	**799**
	College		**39071**
	Stand Alone Institution	Diploma Level Technical	3867
		PGDM	435
		Diploma Level Nursing	3060
		Diploma Level Teacher Training	4403
		Institute under Ministries	158
		Total	**11923**

Data Source:
For School Education: National Institute of Educational Planning & Administration, New Delhi
For Higher Education: Department of Higher Education, MHRD, Government of India
* Figures are provisional.

https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/ESAG-2018.pdf[52]

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[52]https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/ESAG-2018.pdf

Table-7: Level-wise Enrolment in School & Higher Education: 2015-16

(In Thousand)

Level	All Categories			SC			ST		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Primary (I-V)	66873	62250	129123	13274	12469	25743	7102	6636	13739
Upper Primary (VI-VIII)	34720	32874	67594	6750	6427	13177	3416	3215	6631
Elementary (I-VIII)	101593	95124	196717	20024	18896	38920	10518	9851	20370
Secondary (IX-X)	20547	18598	39145	3824	3487	7311	1710	1614	3323
I-X	122140	113722	235862	23848	22383	46231	12228	11465	23693
Senior Secondary (XI-XII)	13002	11733	24735	2240	2047	4287	876	799	1675
I-XII	135142	125455	260597	26088	24430	50518	13104	12264	25368
Ph.D.	75	52	127	NA	NA	NA	NA	NA	NA
M.Phil.	17	25	42	NA	NA	NA	NA	NA	NA
Post Graduate	1818	2099	3917	NA	NA	NA	NA	NA	NA
Under Graduate	14612	12809	27421	NA	NA	NA	NA	NA	NA
PG Diploma	123	106	229	NA	NA	NA	NA	NA	NA
Diploma	1793	756	2549	NA	NA	NA	NA	NA	NA
Certificate	63	81	144	NA	NA	NA	NA	NA	NA
Integrated	93	63	156	NA	NA	NA	NA	NA	NA
Higher Education Total	18594	15991	34585	2606	2204	4810	917	788	1705

NA: Not Available

Data Source: For School Education: National Institute of Educational Planning & Administration, New Delhi

Figures related to School Education are provisional.

https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/ESAG-2018.pdf[53]

However, the abundance of freely available content accompanied with a lack of formal recognition poses a critical threat to the

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[53] https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/ESAG-2018.pdf

growth of the online learning sector. The industry is moving forward with the adoption of latest technologies like Artificial intelligence (AI), machine learning (ML), Big Data Analytics, Blockchain and others to improve the learning experience.

3.2 Growth of E-Learning in Times of COVID-19

The impact of COVID-19 has been global schools, colleges and almost all educational institutions have remained shut. As a result, a total of 1.2 billion children were left out of the formal education system due closure of schools. This inconsistency had created a vacuum which was filled by E-learning platforms. According to a report published by the government of India, E-learning facilitates better retention of information, is easy to understand and enhances conceptual clarity in students. This means that the changes induced by COVID-19 are here to stay. Whether it is language apps, virtual tutoring, video conferencing tools, or online learning software, there has been a significant surge in usage since COVID-19.
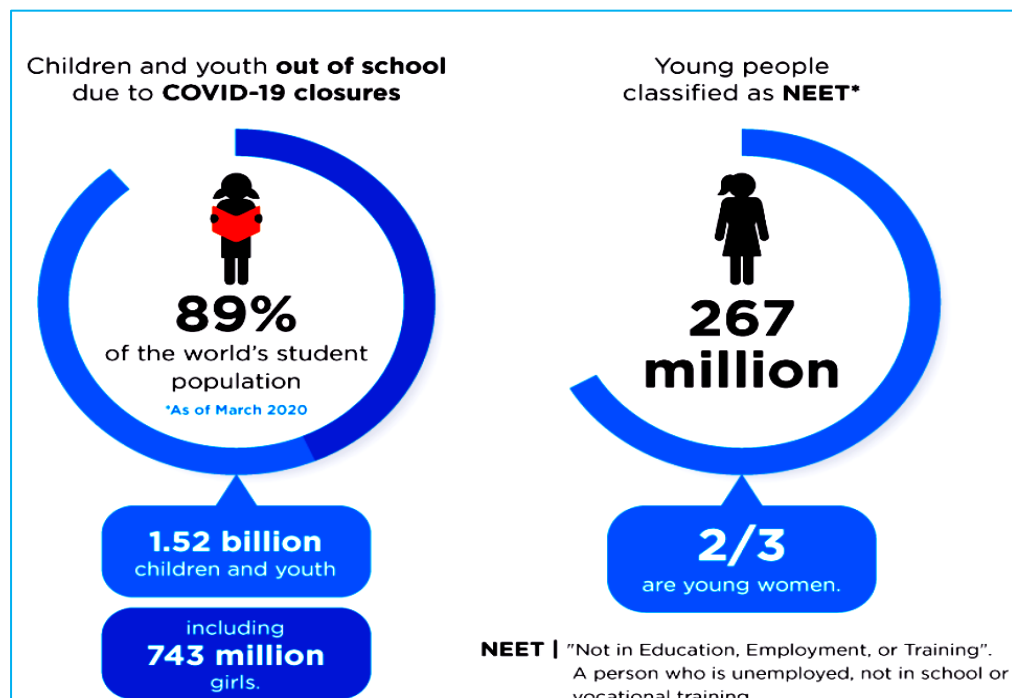
The adaptability to E- learning has not been uniform, as students from Denmark, Switzerland, etc are waiting for schools to reopen, but in countries like South Korea, students have been participating in classes promptly. These responses suggest that adoption of E-learning will not be uniform, its adoption will continue with variations in the post-pandemic world.

In Asia, E-learning has become increasingly popular. Due to consistent rise in Internet users and the revolutionary changes which are happening in the educational sector, this has created a very fertile environment for E-learning to grow.

https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/[54]

During 2014-2019, E-learning grew at a rate of 11%. This shows that even before COVID-19 this sector was on a continuous growth trajectory, with global investments in this sector reaching $18 billion in 2019.

This persistent rise is an outcome of increased digitisation, wider penetration of mobile internet, cheaper rates of internet data, focused governmental initiatives and the advent of budget smart phones. Further, the multi-pronged benefits associated with E-learning has given an impetus to its acceptance and popularity, for example, it is more comprehensive than the traditional teaching methods, it can be modified as per the needs of the students making it more personalised and more interactive.

E-learning has applications in agriculture, healthcare, industrial training. Nowadays, it is used in the corporate sector for conducting training programs and assignments. More and more countries are switching to E-learning to reduce exposure of students and to complete their curriculum in time. For instance, the World Health Organization (WHO) is providing online courses to educate and train healthcare professionals about the associated risks while treating COVID-19 patients. Furthermore, the growing trend of sustainable organic farming has increased the demand for newer mobile applications, E-learning study material for the agriculture sector. Hence, the integration of gamification techniques in e-learning modules will create a positive outlook for this market in the coming years and this market of online education is projected to reach $350 billion by 2025.

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[54] https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/

https://www.globenewswire.com/news-release/2020/10/01/2102024/0/en/Global-E-Learning-Industry-2020-to-2025-Impact-Analysis-of-COVID-19.html[55]

How is the education sector responding to COVID-19 in different countries?

Different countries have opted for different mixes of strategies.

In India, in response to the demand created by COVID - 19, many online learning platforms have reduced their fee. For example, BYJU's, an Indian online education firm, founded in 2011 has started offering free access to its resources via think and learn app. Such initiatives have increased the number of newer student registrations by 200%. Such strategies have resulted in greater market share for BYJU's . Today, BYJU's is the world's most priced Edtech company.

Meanwhile in China, the Chinese government has instructed a quarter of a billion full-time students to resume their studies through online platforms. This has resulted in the largest "online movement" ever in the history of the education industry where approximately 730,000 or 81% of the total K-12 students are attending classes. This online platform was developed by Tencent technologies and was named "Tencent Classroom". This program was first launched in Wuhan, which was the epicentre of COVID-19.

In Singapore, LARK technologies, a subsidiary of Byte Dance, started providing unlimited video conferencing time, CAD (computer aided design) capabilities, real-time co-editing of project work, and smart calendar scheduling. Thus, becoming a one-stop shop for teachers and students.

In the US, some schools have forged unique partnerships where they have launched separate educational channels.

In the UK, BBC has launched a virtual learning programme called "Bletesize Daily", this programme will provide a 14 week curriculum-based learning for kids across the UK. The highlight of this programme is that several celebrities like

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[55] https://www.globenewswire.com/news-release/2020/10/01/2102024/0/en/Global-E-Learning-Industry-2020-to-2025-Impact-Analysis-of-COVID-19.html

Manchester City footballer Sergio Aguero will teach some of the content.

The challenges of online learning

Online education has a bright future, but its journey is fraught with several challenges. Some of these challenges are listed as following:-

1. Insufficient Digital infrastructure : Although Indian government has been proactively focusing on creation of Digital infrastructure, progress has been slow. According to the World Economic Forum, only 15 out of 100 families have access to internetconnectivity.Mobile broadband is also availed by a few, with only 5.5 subscriptions for every 100 people. Rural areas have yet to see the penetration of Broadband lines (fibre-optic cables). Also, the speed of accessible internet is also an issue.

    Building India's digital highway (livemint.com)[56]

2. Absence of single language for communication and transmission : India is a diverse country with 22 official languages and many regional languages. In order to reach a wider audience, there is a need to provide the generated content in vernacular languages. Hence, this limits the reach of online education which uses English as a base language.

3. Poor Learning Engagement : In traditional learning, there is greater engagement between the teacher & students and between peers. E-learning has not developed to a level so that it can stimulate open-ended or crowd learning. Also, there has been a big problem in enforcing discipline among the students.

4. Lower level of Digital literacy among teachers

5. Low completion rates: Online courses are self-paced learning. There is minimum or negligible motivation due to lack of face-to-face interaction. Hence, the completion rate of online courses is exceptionally low.

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[56]Building India's digital highway (livemint.com)

6. Lack of uniform and standardised texts, certifications and quality : Today there is no regulatory authority which could regulate and ensure a bare minimum quality standard for prevailing players. Different platforms provide several videos on the same topics, with different instructors, this induces a lot of variation even on the same topic.

Is learning online as effective?

The efficacy of something can be gauged from its impactfulness. Today millions of students and working professionals are enrolled in online courses. Online platforms like Udemy, Coursera, BYJU, Unacademy etc are witnessing increased student engagement everyday. This is a proof of increased popularity of these platforms.

According to a recent MIT study, the effectiveness of massive open online courses (MOOCs) is same as the lessons traditionally taught in a classroom or a lecture hall.

The reasons behind this effectiveness are as following:-

1. It provides an opportunity to enhance your professional skills, without formal schooling.

2. It facilitates direct communication with a diverse set of instructors and subject specialists who can be anywhere in the world.

3. It saves time and cost.

4. It provides an opportunity to personalise our learning experience, which further increases its efficacy.

5. Since, the course can be scheduled as per our requirements, this not only provides ease in accessibility but also promotes self discipline.

6. Evaluation can be done immediately.

A changing education imperative : Education 4.0

There has been a growing disconnect between the industrial needs and the education. According to the world economic forum, 65% of the children entering into our schooling systems will work in jobs that do not yet exist.

Schools today face three critical challenges :

Tomorrows Needs:	Students are not being prepared to be competitive in a rapidly changing world, and the nation's schools are not changing fast enough to keep up.
Today's Budgets:	Schools have been riding a funding roller coaster for most of the last decade and cannot expect major new funding sources anytime soon.
Teaching:	Many students do not have access to the best teachers, the best teaching strategies, and enriching learning experiences.

Similarly, teaching profession also faces several challenges, some of them are as following:-

* Nation's teaching force is increasingly less experienced
* Schools face shortages of teachers in critical areas like physics and chemistry, this means that students do not get the opportunity to study contemporary scientific developments.
* Challenge of finding well qualified teachers in rural areas.
* Low teacher to pupil ratio, makes it difficult for teachers to transmit their knowledge in more effective form.
* Teachers are paid below the minimum threshold. For example, in many private schools, a teacher possessing a masters degree in science is being paid only 6000.

Education 4.0 is a step in this direction, where we move away from the assembly line model with standardized curriculum and pedagogy towards a personalised learning. This will be a phase where innovation and creativity will be rewarded more in comparison to academic skills and rote learning.

Critical for learning success with Education 4.0 is developing a comprehensive strategy that has a foundation of involvement and sustained career training for teachers—not occasional professional development— along with a sustained

focus on comprehensive learning of students which concentrates not just on the technology, but also on the pedagogical skills needed to use the technology in teaching and learning.

Our current strategy should be a mixture of whole-school reforms, which should focus and promote E-learning in a big way.
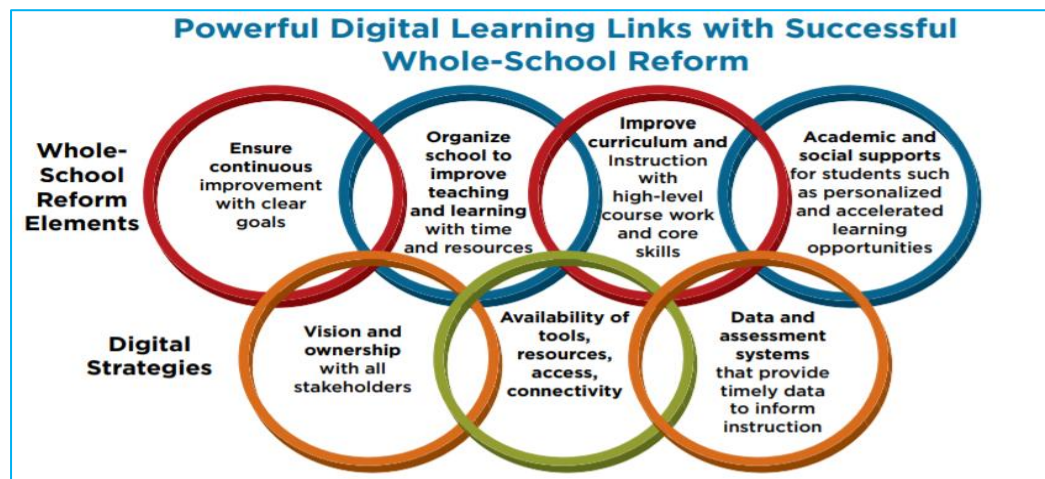
Major world events are often an inflection point for rapid innovation – a clear example is the rise of e-commerce post-SARS. This is an indication that the green shoots which have been appearing in the field of E-learning will develop into fully grown educational systems. A continuous increase of investments in this field is the evidence.

It is clear that this pandemic has utterly disrupted an education system that many assert was already losing its relevance. It is true that the acceptance of this novel system will not be without hiccups, as adoption of this system will require abandoning of many age-old practices and a drastic shift in how we teach and learn. The strategy going forward will be a blend of physical and cyber worlds, where a combination of online and offline mediums will make education more participant oriented and efficient.

In this technology driven age, changes to traditional educational systems are inevitable. Now the main focus is to give the power back to the learners, they should decide what they want to learn and how they want to learn.

Today's age is the age of hyper-individuality, where uniqueness is not only appreciated but also promoted and desired by changes.

Education: Conventional to Digital

https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/[57]

Education: Conventional to Digital

[57] https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/

4   Conventional to Digital education

The scope of E-learning goes beyond school education, as it includes courses and modules for competitive exam preparation, professional skill enhancement, and other non-academic subjects.

Key categories of online education

Primary and secondary supplemental education	Supplement to school learning for students enrolled in primary and secondary classes in school
Higher education	Provide an alternative to traditional higher education courses Online programmes aimed at coaching students in preparation for competitive examinations
Test Preparation	Courses designed to assist users in skill enhancement, which may result in certifications
Reskilling and online certifications market	Learning of non-academic subjects such as spoken English and playing guitar

According to a recent report, in 2018 the online education market in India was valued at INR 39 billionand is expected to reach INR 360.3 billion by 2024, growing at a compounded annual growth rate of approximately 43.85% during the 2019-2024 period. In fact, India's E-learning market is 2nd largest after the US.

https://www.businesswire.com/news/home/20200417005258/en/Online-Education-Market-in-India-Worth-INR-360-Billion-by-2024-Exhibiting-a-CAGR-of-43---ResearchAndMarkets.com[58]

Reasons for switching to E-learning

1.   Growth in internet penetration and advent of budgetary smartphones :In May, 2020 for the first time India had more

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[58] https://www.businesswire.com/news/home/20200417005258/en/Online-Education-Market-in-India-Worth-INR-360-Billion-by-2024-Exhibiting-a-CAGR-of-43---ResearchAndMarkets.com

rural internet users than urban users. This information was published by the Internet & Mobile Association of India (IAMAI) and Nielson. Now, India has the second largest population of active internet users, after China.

The internet allows diverse courses, certifications and various professional across the globe easily accessible to urban and rural, mentally and physically restrained population of the world.

https://timesofindia.indiatimes.com/business/india-business/for-the-first-time-india-has-more-rural-net-users-than-urban/articleshow/75566025.cms[59]

2. Low cost of online education : Online educators reach out to the masses without setting up physical infrastructure, this reduces fixed costs and running cost of operations like staff salary, stationary, books etc. This cost saved is passed on to users.

3. Inability of traditional model to fulfill additional capacity :The aim of the government is to raise its current gross enrollment ratio to 30% by 2020. India will have the world's largest tertiary-age population and 2nd largest graduate population globally by the end of 2020. However, the existing educational infrastructure is not equipped to meet the additional capacity. The e-learning modalities can supplement the traditional model, and bridge the gap to a huge extent.

4. Incentivisation by Indian Government under "Digital India' and "Skill India" initiatives : Current establishment has been following the principle of "access, equity and quality" in order to boost India's digital literacy. Also, government has been making efforts to provide broadband till village panchayat level under national optical Fibre mission.

   There are other initiatives also like SWAYAM (MOOCs based curriculum, taught in classrooms), E-Basta etc

5. Demand among working professionals : According to world Bank, automation threatens 69% jobs in India and continuously changing technologies will further intensify

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[59] https://timesofindia.indiatimes.com/business/india-business/for-the-first-time-india-has-more-rural-net-users-than-urban/articleshow/75566025.cms

layoffs in IT, BFSI, Telecom and manufacturing sectors. In order to remain competitive, professionals need to upskill themselves from time to time. Also, the knowledge of newer technologies help in career advancements. Both job-seekers and working professionals need to gain and enhance their skills through career advancement courses. They feel that such courses could increase their chances of landing better jobs, switch jobs, get promotions, negotiate better pay packages and stay industry-relevant.

https://economictimes.indiatimes.com/tech/internet/indias-internet-users-to-double-to-730-million-by-2020-leaving-us-far-behind/articleshow/53736924.cms[60]

https://economictimes.indiatimes.com/jobs/digital-marketing-big-data-top-employee-reskilling-wish-list/articleshow/56744486.cms[61]

https://timesofindia.indiatimes.com/business/india-business/for-the-first-time-india-has-more-rural-net-users-than-urban/articleshow/75566025.cms[62]

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[60] https://economictimes.indiatimes.com/tech/internet/indias-internet-users-to-double-to-730-million-by-2020-leaving-us-far-behind/articleshow/53736924.cms

[61] https://economictimes.indiatimes.com/jobs/digital-marketing-big-data-top-employee-reskilling-wish-list/articleshow/56744486.cms

[62] https://timesofindia.indiatimes.com/business/india-business/for-the-first-time-india-has-more-rural-net-users-than-urban/articleshow/75566025.cms

Education: Conventional to Digital

Here are some facts which point out towards the huge untapped potential in India:-

- Total market size of $735 million

- 4,530 active Ed-Tech start-ups in India

- 435 start-ups founded in the last 24-months

- 120 % expected growth in FY 2021

- Expected to reach $1.7 billion by the end of the year 2021

- It is expected to grow 8 to 10 times in the next 5 years owing to the repercussion of the pandemic

https://timesofindia.indiatimes.com/readersblog/sanjay-shukla/outburst-of-e-learning-industry-in-india-amidst-covid-19-crises-28559/[63]

According to experts, the unprecedented situation caused by Covid-19, only accelerated the Edu-tech revolution. The changes which were supposed to be gradual were accelerated to an extent that what would have happened in 3 years, happened in 3 months.

A perfect case study to supplement this theory is that of Entri app - a test preparation mobile app. It had 15 lakh subscribers in january 2020, but due to Covid-19, it increased its subscriber base to 50 lakhs within the next 5 months. Such case studies reflect that the online education system will emerge as the prominent form of supplementary learning education system. Even niche learning apps like those dedicated to children with learning disabilities are catching up,

In conclusion, we can say that digital learning is here to stay. According to a recent survey, 75% of the parents believe that, nowadays, E-learning has become an inseparable part of the contemporary educational system. E-learning platforms are performing a task which was earlier performed by private tutors, but in a more efficient and effective manner. This has made learning an easier and better process.

https://www.newindianexpress.com/cities/kochi/2020/aug/08/e-learning-enters-its-golden-age-2180521.html

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[63] https://timesofindia.indiatimes.com/readersblog/sanjay-shukla/outburst-of-e-learning-industry-in-india-amidst-covid-19-crises-28559/

4.1 Transition from Conventional to Digital education

India is a swiftly transforming nation for which education and its infrastructure holds utmost importance. According to a study, INTRODUCTION: INDIA IN THE 21ST CENTURY (https://wenr.wes.org/2018 /09/education-in-india) India has the largest youth population in the world.

- 600 million young people under the age of 25
- 28% of the population is less than 14 years of age
- more than 30 babies being born every minute

Population growth rates are expected to remain at around 1 percent for the next few years. Keeping such figures in mind, India could achieve a significant competitive advantage over countries like China, if it manages to:

- modernize and expand its education structure,
- increase educational attainment levels, and
- provide skills to its youth.
    Teaching a rapidly growing and expanding young generation needs a different approach from the traditional, conventional one. Teachers need to adopt innovative methods.

- They have to be more comprehensive, communicative and technological.

- Prevent students from losing interest by avoiding the use of traditional chalk and talk methods.

- They tend to stop trying in accomplishing tasks given, and perform below average in exams

(Felder & Silverman, 1988; Godleski, 1984; Oxford, 1990; Smith &Renzulli, 1984) https://trivium21c.com/2017/04/22/the-problems-with-traditional-education/[64]

Scholars Freire and Dewey opine rather than being a facilitator of knowledge, education has become an act of depositing knowledge where the students are behaving as depositories (receptor) and the teacher is the depositor.

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[64] https://trivium21c.com/2017/04/22/the-problems-with-traditional-education/

https://www.freepik.com/free-photo/confident-teacher-explaining-lessonpupils_10586173.htm#query=teacher%20study%20kids&position=15

[65]

In the conventional method, the students are sitting in a passive environment. They tend to work individually on the short assignments that are created by the teachers to assess what the learner's have memorised.

So, it can be said that the teachers simply issue communiques and make deposits which the students patiently receive, memorize, and repeat. This is the "banking' concept of education, in which the scope of action allowed to the students extends only as far as receiving, filing, and storing the deposit.

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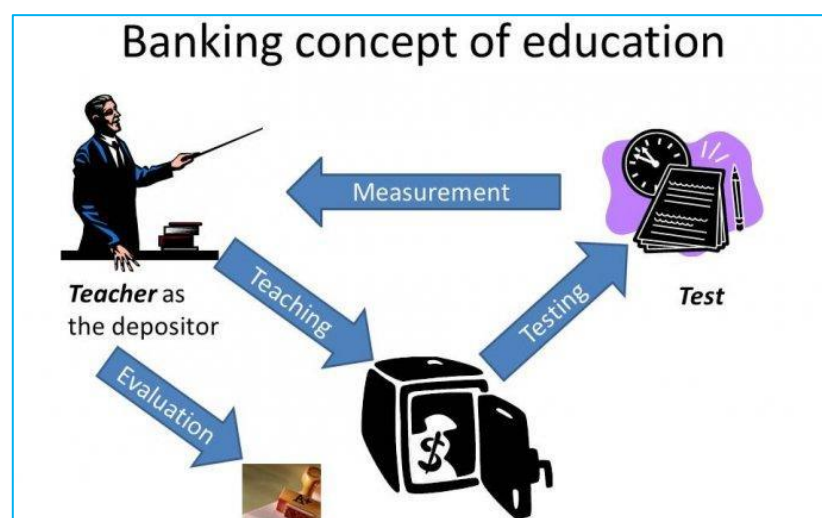
[65]https://www.freepik.com/free-photo/confident-teacher-explaining-lessonpupils_10586173.htm#query=teacher%20study%20kids&position=15

http://wall-street.education/street-202[66]

Only good communicators in the class can benefit from this method. It is said that knowledge emerges only through invention and re-invention, through the restless, impatient continuing and hopeful inquiry that students pursue both individually as well as with their peers.

https://trivium21c.com/2017/04/22/the-problems-with-traditional-education/[67]

The conventional teaching methodology shapes students that they demonstrate their knowledge and content mastery in tests. There is one assignment for all students with mind frames and all are expected to outperform each other. Students and parents do not realise the importance of innovation and keep focusing on attaining good grades in the exams rather than successfully applying the concepts to real life to understand their applicability. But only teachers cannot be held responsible to metamorph the education system. This has to be an integrated effort from parents as well as teachers. Teachers are equally good to teach children. The problem lies in the delivery method. Quality education is compromised in most cases in traditional classrooms and the end sufferers are students only. To enable children to access quality education, teachers need to be up-skilled and curriculum needs to be standardized, which both are not easy. https://edtechreview.in/trends-insights/insights/3553-challenges-traditional-education-faces-today-and-the-need-to-shift-to-smart-classroom[68]

The transformation of conventional to modern methods of learning and teaching is the effective and optimal use of technology and the unlimited information available at our disposal. There is a sea of knowledge but what to study and what not to study has to be chosen wisely.

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[66]http://wall-street.education/street-202

[67]http://wall-street.education/street-202

[68]https://edtechreview.in/trends-insights/insights/3553-challenges-traditional-education-faces-today-and-the-need-to-shift-to-smart-classroom

21ˢᵗ Century learning is ……..

Issues of the conventional method of teaching and learning:

One Fix For All :Traditional education is one-size-fix-all approach. It is not personalized. As it is not personalized, students cannot initiate learning on their own. They can't learn in the way they like or what interests them. As a result, children don't find joy in learning.

Performance Pressure :Traditional education is still driven by fear of exams. Children have to face a lot of exams or tests throughout their academic years, from kindergarten to primary to junior school.

Teacher-student ratio in Classroom :In a country like India with 1.3 billion population and with 359 million youth, the teacher-student ratio in Indian classrooms is a huge challenge. The ideal worldwide teacher-student ratio is 1:10, while in India it is 1:40.

https://edtechreview.in/trends-insights/insights/3553-challenges-traditional-education-faces-today-and-the-need-to-shift-to-smart-classroom[69]

Lack of Active Participation by Pupils ;Children should not be passive receptors of handed down discriminatory, artificial, arbitrary knowledge. They should be the makers of their future. In order for this to occur they need to be

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[69]https://edtechreview.in/trends-insights/insights/3553-challenges-traditional-education-faces-today-and-the-need-to-shift-to-smart-classroom

able to reinvent the world. This means that education is a creative act.

https://trivium21c.com/2017/04/22/the-problems-with-traditional-education/[70]

Teaching of what is incorporated in books : The finished product of what is incorporated in the books with little regard either to the ways in which it was originally built up or to changes that will occur in the future.

Lack of Creativity and Transformation :Narration (with the teacher as narrator) leads the students to memorize mechanically the narrated account. Students are turned into "containers," and "receptacles" to be "filled" by the teachers. The more completely the teacher fills the containers/receptacles, the better a teacher she is. The more meekly the receptacles permit themselves to be filled, the better students they are. "*Pedagogy of the Oppressed*", Paulo Freire, 1968.
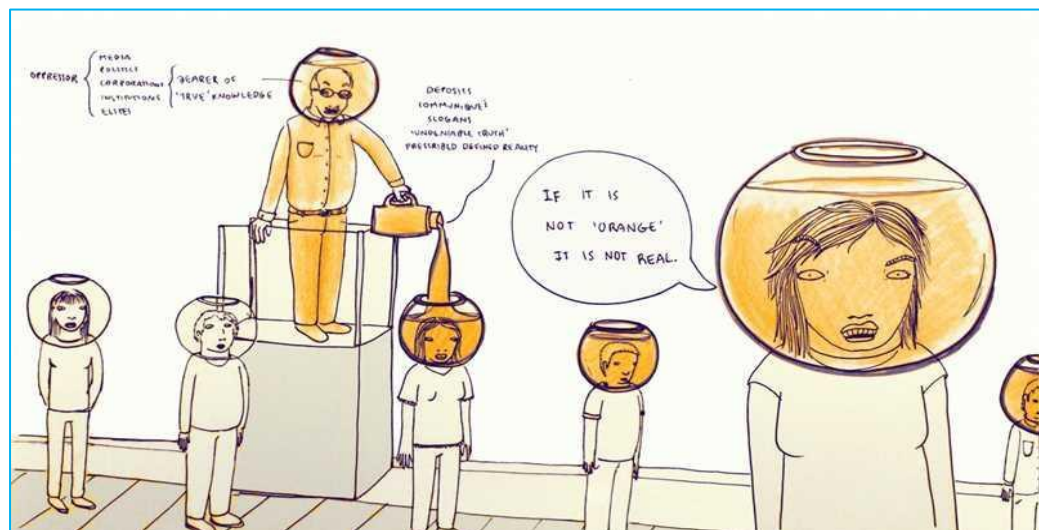
Researchers have urged educators and parents to shoot and promote more student centric techniques in order to inculcate collaborative learning. Ozden, Erturk, and Sanli (2004) saidthatintegration of technology requires a well knitted collaboration between academicians and the technical stakeholders like - institutions, governments, parents and others.

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[70]https://trivium21c.com/2017/04/22/the-problems-with-traditional-education/

Memorizing the study material cannot be adequate for students to apply the concepts in real life situations. Such practice is unhealthy and thwarts the learning outcomes. Participants of this study and social scientists in the language field agree that we need to adopt changes to teaching pedagogies or else students will still face the lack of concept clarity, issues in understanding and inability to converse in the language learnt (Ellis, 2008; Goh & Chapman, 2006; MacGowan-Gilhooly, 1991; Ortega, 2009).

https://files.eric.ed.gov/fulltext/EJ1096025.pdf[71]

With an ever growing internet facility being enjoyed in each sector, the education industry is no exception to its fruits. E-learning has played an important role in handling the issues and problem of teaching today. With hi-tech networks and multimedia, the education sector has emerged to be one of the fastest emerging fields. Technological advancement has made us tech savvy. With the use of technology in the education sector, there is a major change in the teaching and learning methods, styles, and content across many schools in India.

Makes learning an interactive process and challenges students to reach new paradigms.

Ed-tech technology makes us future oriented.

Improves skills like team building, communicating, planning, problem solving, self direction, diversity, becoming social, presentations, listening, etc.

Makes students more collaborative as they learn to interact with students from different geographic locations

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[71] https://files.eric.ed.gov/fulltext/EJ1096025.pdf
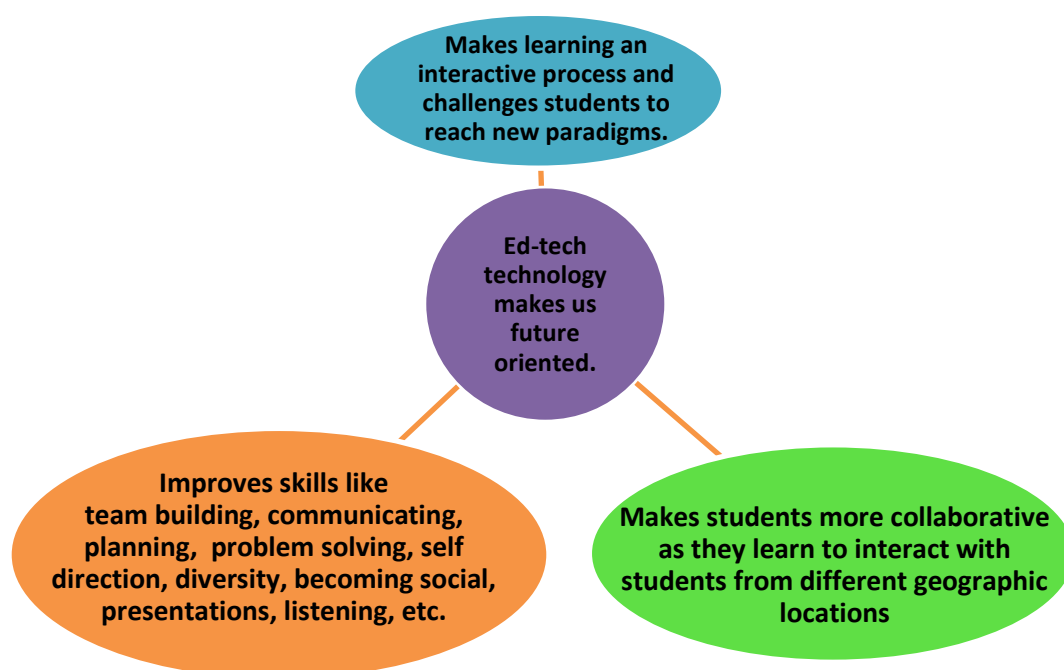
With the objective to bring the nation under the blanket of technological and internet advancement, Prime Minister Modi's administration has launched the Digital India campaign. Some of this campaign's targets include providing broadband connectivity to a quarter of a million rural villages and making wi-fi connections available in schools.

Internet in India [9]	
As of November 2019:	**Mobile penetration in India •**
• 54 percent of the urban population of 12+ years and 32 percent of the same in the rural areas had internet access • 77 percent of urban and 61 percent of rural internet users aged 12 and above used it every day, while 7 percent of urban and 13 percent of rural users used it less than once a week • 99 percent of both urban and rural Internet users aged 12 yrs. and above used mobile phones to access the Internet • 433 million people aged 12 yrs. and above, and 71 million people aged 5-11 yrs. were active internee users in India	502.2 million people in India had smartphones as of December 2019[10] • The number of smartphone users is expected to be 859 million and 504 million respectively by 2022[11]

Over the past decade, the internet user base in India has grown exponentially. India is the world's second-largest in the list, owing to the availability of low cost mobile phones, the expansion of 3G and 4G coverage, and people's reliance on digital transactions.

https://www.orfonline.org/research/strengthening-the-online-education-ecosystem-in-india/[72]

With the help of internet and tech enabled learning there has been a transformational change in online education pedagogy and regular classroom based pedagogy. There is more

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[72] https://www.orfonline.org/research/strengthening-the-online-education-ecosystem-in-india/

flexibility and learning support than the traditional methods.

Technology makes teachers and educators more collaborative and extends learning beyond classrooms. Educators have the capability to create learning groupsincluding students, experts, and fellow educators in different disciplines across the globe.

In a multilingual country like India, language can create many barriers to learning. But thanks to the text translation and machine learning aims to create deep-learning systems that can translate English lectures into a student's native language.

Similar technologies in voice recognition are available that can summarise and transcribe an entire lecture and reduce paragraphs of text into relevant bullet points.

https://timesofindia.indiatimes.com/blogs/toi-edit-page/how-tech-is-shaping-education-technology-can-offer-more-flexibility-and-learning-support-than-traditional-formats/[73]

Critical thinking and the ability to understand the academic languages with which we communicate our thoughts are the key skills which enable us to remain flexible in the face of a perpetually changing world.

Considering the changing requirements the mentors, teachers, administrators, policy makers and even the Ed tech companies should focus on the technologies for bringing and vital change and giving new learning experiences to our students.

"Students, educators and parents agree – we need a different kind of learning experience to prepare students for the future"

Pedagogy entails knowledge impaction on a learner through a well-defined learning process which lately is becoming complex due to evolution of ideas and societal changes. This is the learning process which includes a strategy of intentionally delivering lessons in a professional wayso as

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[73] https://timesofindia.indiatimes.com/blogs/toi-edit-page/how-tech-is-shaping-education-technology-can-offer-more-flexibility-and-learning-support-than-traditional-formats/

to help the student acquire professional skills and make continuous changes.

There are two major teaching methods:

- problem-based learning (PBL)

- conventional teaching methods (CTM).

The PBL is a student-centered learning method involving critical thinking in order to solve problems for empowering students to take more responsibility at the same time increasing their sense of motivation and accomplishment.

CTM known as the traditional method of learning is teacher-centered where information is delivered by the teacher. The students passively memorize facts and are not actively involved. This teaching method appears to be of immense benefit to students who learn best by listening. According to Awotua-Efebo, the fundamental nature of teaching is to encourage students to attain, retain and use the knowledge, grow the ability to criticize, synthesize and analyseproblems while developing their own perspectives. In order to achieve this objective teacher must consider:

-the subject to be taught,

-learner environment and

-learner's needs.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6815472/[74]

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[74]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6815472/
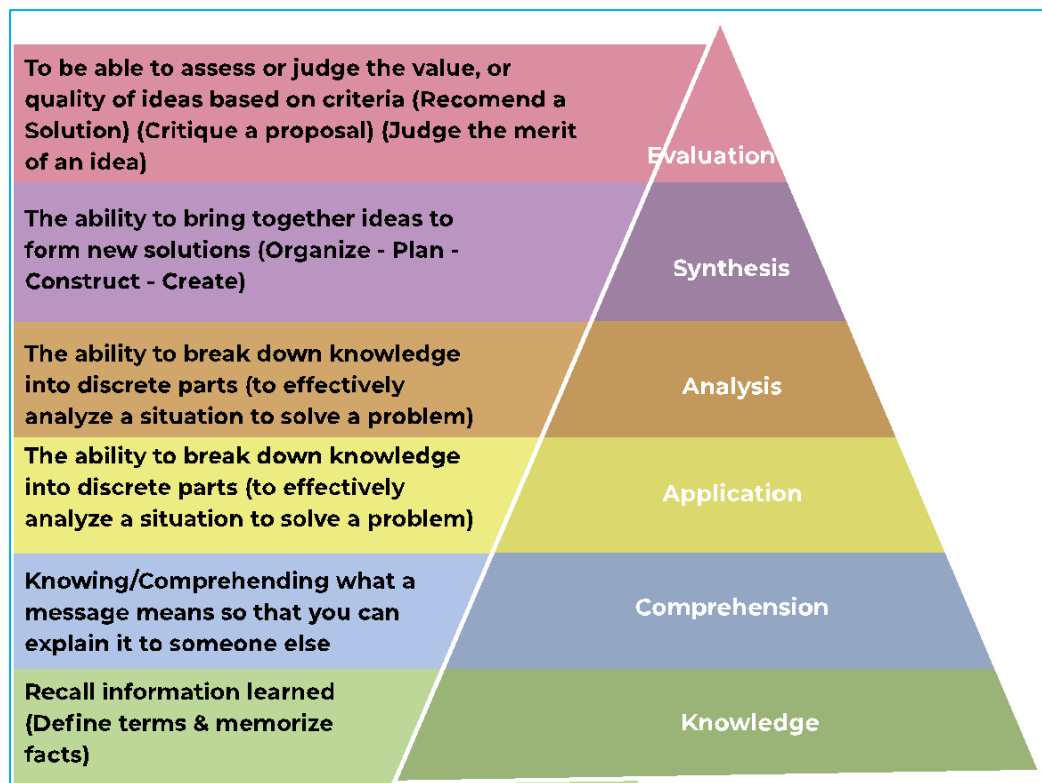
The Bloom's Taxonomy explains effective learning in 6 levels -

- attaining knowledge

- Comprehending information

- Application of information

- Analysis of information for the using it according to the current situation

- Ability to synthesis something new using the available information

- Evaluate an idea

Learning should begin by training the students level wise beginning from the lower level going up the ladder to the higher levels.

Students should be able and made capable to understand and recall the knowledge imparted to them. This doesn't imply

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memorising the information without understanding its utility. Rather it implies that the student should be taught in a way that they can recall the information in the future in a relevant situation.

Unless a student is able to understand a concept he or she would not be able to explain it to anyone else.

The ability to apply a concept to solve a real life problem can be developed only when the students have been explained the concept using real life situations. Simply making them memorize the definitions would not solve the purpose of education. The students should be taught in a way that they can resolve any problem using the education they have received.

Capability to analyze the knowledge learnt. Break down the concept to effectively analyze a situation.

Capability to bring together the pieces and create a new idea.

And the highest level is when a student can recommend, criticise and judge an idea.
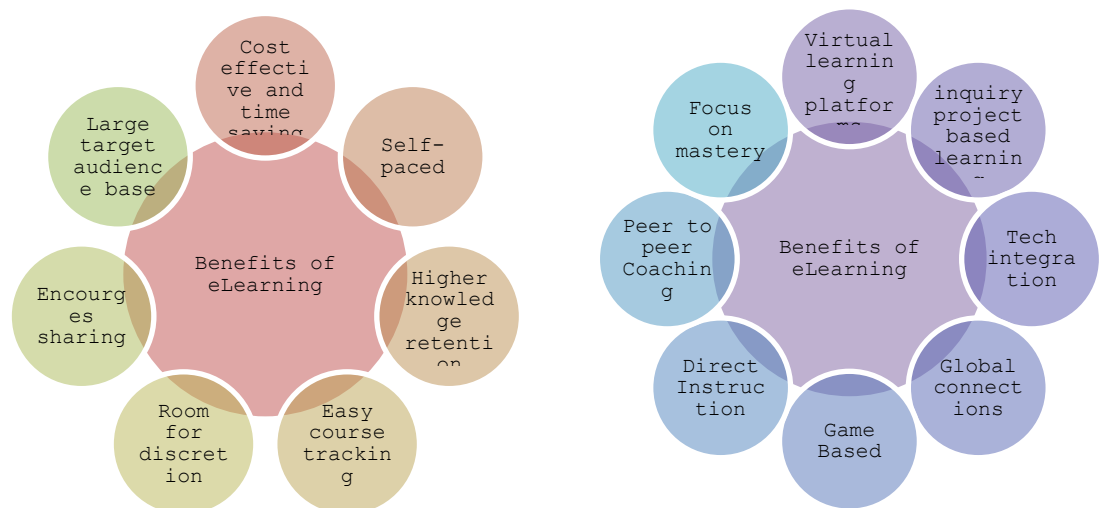
Benefits of Digital Education

Technology has given a boost to the practice of student centered teaching methodology. There is a complete revolution in the way education was practiced a decade ago. Teachers are now using various equipment provided by the Ed tech companies to increase student engagement and make teaching an interesting activity.

This new learning-teaching model is more interesting and personalized. With the inclusion of this kind of technological in the school teaching methodology, students feel studying as enjoyableand above all interesting.

- Video Lessons : Animated and video lessons are a very creative feature of the Ed tech products. This feature has made students more engaged in learning and allowed them explore the fruits of technology. It facilitates learning with a derivation of learning out of leisure along with creativity, fun and entertainment on cards through the available Apps, videos, podcasts, interactive software, e books and online interactive electronic boards.

  Video-based learning is more interactive and attracts the students. The facility of real-time interaction between teachers and students encourages and allows exchange of ideas and information at an accelerated level. Thisincreases the academic performance of students. It allows flexibility to learners for attending the live online lecture or watch a recorded video for any class anytime, anywhere. The learners can go through it numerous number of times as they want to completely understand the lecture's teachings without any hindrance.

- Game based learning : Many game based learning solutions have developed that help the students in learning.

- No Restriction of Physical Boundaries : E-learning is based on the anytime, anywhere learning formula. Students can study from any part of the world from the faculty of their choice sitting in some other country. Sessions can be virtually attended and delivered anytime from the comfort of your home. Digital education has given the power of education to students in remote areas by providing equal learning opportunities to all. Learners living in tier 2 and tier 3 cities and rural areas no longer need to relocate to metropolitan cities for higher or professional education as digital learning has reached

their homes and has changes their homes into classrooms. Advanced technology is teaching students while they are seated in the comfort of their homes. All they need is an internet connection to avail of the facilities. Students can learn online very easily and regardless of theirdemographicandgeographic differences.

- Cost saving : E-learning offers excellent course modules at very cost effective and reasonable rates. Students are saved from the expense of going up and down the coaching centres and from paying high fees as well.

- Self-paced Learning : Educational technology enables the students to do the learning at their own speed. Some students are quick while some are slow learners. Students have the freedom to visit and re-visit the video lessons, questions, etc. any number of times. etc. students to learn from portable devices including mobile, laptop and tablet in their favourable schedule.

  Digital education feeds the strengths, aptitude, weakness, challenges and opportunities of an individual. Students are free to decide the place, time, duration for the learning timing, place and duration in a self-paced learning space. In this manner they are being shaped into a more matured and responsible individual with a dynamic personality.

- One-on-one Learning Methodology: Opposite to the traditional, teacher cantered classes where individual attention on students is lacking, online classrooms isbuilt on the one-on-one method of learning. Teaching experts can focus on teaching every student on an individual level while students can also ask their doubts to the faculty via chat, call or video. Technology offers an enhanced experience to the learners as they are connect with the teachers without from the space of their own comfort - anytime and anywhere. Prompt feedback and interactionssessions let students improve their skills, evaluate their performance and keep track record of their coursework,

progress and more. In the future, Learning Management System (LMS) would further enable two-way communication between students and teachers.

- Interactive Study Material: As compared to the usual heavy textbook learning, online learning or e-learning offers interactive study material in the format of infotainment. Students get good quality study notes in the form of audio-video explained lectures, 3D & 2D animations, short films, graphics, comics, in form of games and flash cards that has tremendously removedthe cramming habits of students. Multimedia involvements in the education sector stresses on caters students into concept-based learning while broadening their imagination and cognitive skills. The study material offered in form of infotainment is to the point, crisp, easy, short as well as interesting. It is easy for learners to apprehendthe syllabusand add to their knowledge quotient. Interactive study material is easily accessible online or can be downloaded to mobile devices like cell-phone, tablet, laptop to study whenever and wherever the student wants. https://www.entrepreneur.com/ article/337276[76]

Various Factors have been responsible for the growth of e-learning industry.

Information and Communication Technology is now being considered as an important factor for the growth of schools in India. Digital technologies are being included in the teaching methodologies. Various digital activities are being included in the day-to-day activity to boost the teachers' confidence in digital competence. Teachers are also being trained in other ICT related professional development programs.

Digital education has not just grown because of the efforts of the teachers and edtech companies but home environments of the students have also impacted its growth. Parents have been encouraging their children to subscribe to the edtech

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[76]https://teachonline.asu.edu/2012/07/writing-measurable-learning-objectives/

websites and learn in new ways. Both parents and students are supportive of the digital policies of the schools. Digital technology equipment such as internet equipment, laptops, tablets, and smartphones are being provided to the students so that they can connect with the world from the comfort of their homes. Students have also become inclined towards the freely accessible digital content.

The UNESCO Institute for Statistics has marked the following indicators as "internationally comparable" responsible for the growth of the digital education:

- Political commitment of the governments

- Public-private partnership

- Latest Curriculum Designs

- Digital Infrastructure

- Digital development and training of the Teaching staff

- Good Internet connectivity at the schools and homes of the students. This means that learners have access to computers and the internet at their place of study.

- Increased participation and output of both students and teachers.

- Equity in the proportion of schools in rural as well as urban areas using ICT

https://www.orfonline.org/research/strengthening-the-online-education-ecosystem-in-india/[77]

Technology has made the teaching-learning process very easy and interesting.

The state governments are also giving a boost to the adoption of technology in schools. Rahul De, Professor, Quantitative Methods and Information Systems, Indian Institute of Management, Bangalore (IIM-B) says that "*ICT can have a huge impact on our education system.*" He further mentions that I format and communication technology can

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[77]https://www.orfonline.org/research/strengthening-the-online-education-ecosystem-in-india/

reach pupils at an increased rate at the same time in keeping the costs low. With time and increased penetration of mobile phones and Internet kiosks, the growth potential of online learning is immense.

A study conducted by De in 2009 on the economic impact of free and open source software (FOSS) in India found that it resulted in significant cost savings. "*FOSS can play a huge role in education,*" De notes. "*In the state of Kerala, it has already had a huge impact in both saving costs and providing state-of-the-art access computing to students in government schools. FOSS has a huge number of packages for school students, many of which can be ported to local languages and used in schools. It is also helping disabled students in a big way, by enabling them to access digital resources using audio-visual aids.*"

https://knowledge.wharton.upenn.edu/article/indias-education-sector-moving-toward-a-digital-future/[78]

4.2   Growth and Future Trends in E-Learning

With the widespread implementation of internet and the rise in consciousness about e-learning, the online education industry is growing rapidly and is expected to see phenomenal growth in the next 5 years.

However, the lack of official recognition and endorsement, and plenty of freely available content poses a serious threat to the growth of the sector. The industry is moving towards the adoption of innovative technologies like Big data analytics, Machine learning, Artificial intelligence (AI), block-chain, and many others to improve upon the learning experience.

The online education /e-learning market in India was valued at INR 39 billion in 2018 and is expected to reach INR 360.3 billion by 2024 expanding at a CAGR of ~43.85% during the 2019-2024 period. Availability of a wide range of study materials, flexibility, and ease of learning has impacted the overall growth of the online education industry.

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[78]https://knowledge.wharton.upenn.edu/article/indias-education-sector-moving-toward-a-digital-future/

Why Online education has a promising future in India?

Online education in India has witnessed greater recognition over a few years. It is gradually but surely becoming an essential part of the schools, college institutions, and even in offices all over India. One of the biggest advantages of online education is that this model is scalable. The government authorities are already planning to allow the universities & many other educational institutions to offer fully online diplomas & degrees. This change could reshape & revolutionize the overall education industry in India. According to industry experts, India's E-learning /Online education market will be US$ 8.6 Billion by the year 2026.

Easy accessibility to the internet is the major reason for the progression of e-learning & online education in India. The number of internet users in India increased by 128 million between 2019 and 2020. Surprisingly, rural India has internet users as compared to urban India for the first time. According to a report by IAMAI (Internet & Mobile Association of India) and Nielsen, there were 227 Million internet users in rural India compared to 205 Million in urban India.

Factors driving the growth of India's E-learning Market

There are various factors directly or indirectly responsible for the perpetual growth of the industry from the past few years. Some of the factors are:

1. Expansion & improvement in internet connectivity system and low cost of 4G data.

2. Increased usage of smartphones and their reach to the masses

3. The cost of Online education is comparatively less than traditional programs.

4. Promotion of e-learning policies like SWAYAM, e-Basta & Digital India by the government.

5. Rising demand among working professionals due to the flexibility of time

*E-learning Features &collaboration :*Technology has enriched and enhanced the learning experience for all categories of students. There are various aspects of online education, one aspect is "technology" which is being employed variedly & extensively to deliver to end consumers. Even though the foundation of education is still dependent on reading, writing, and arithmetic, there is no doubt that GenX students will need comprehensive & broader education to be effective contributors in the ever so competitive world and coming future. Teachers, tutors, instructors, and professors may also take advantage of the technology to interact with their students, parents & peers using email and social media platforms.

*Live delivery of instructions:*Certain courses may require specialized instructors. These instructors can remain in one location and provide instruction to many students in other locations, by using live broadcasts. As students move into higher levels of education, this type of specialization increases, for example, this may be applied towards advanced degrees of medicine.

Recorded video content delivery: Pre-recorded content such as documentaries, Webinars, lectures, and other specialized video content may be delivered in a sore model & forward format so that the material can be viewed as and when desired.

One to One student interactions -video conferencing: With regards to the first point, students may learn just as much from each other as they do from their instructors. Video conferencing technology is another tool to connect students and teachers. Thus, communications technology can be used to connect students in different parts of the regions & world so that they may interact directly in real-time irrespective of their locations.

Evaluation test administration remotely: In some countries, standardized tests are used to evaluate students on a level playing field, fairly & . Some important tests must be delivered securely and on time to meet testing schedules of advanced courses & high scale programs. In a huge country like India, for example, this is a daunting task simply

because of the size of the population & its Geography. Digital delivery could be the solution.

Latest & Up-to-date materials: As mentioned above, the basics of education rarely change, but with changing times version updates, additions, deletions are always needed. Textbooks are very expensive to purchase, maintain and deliver and it is not possible to update them, you have to print anew, whereas digital delivery solves this issue when coupled with e-Readers such as tablets.

Self-learning: Computer-based training or self-paced learning is common in advanced education and trade-oriented courses & programs. Kiosks or terminals to support this may be found in underserved areas where populations work. At the higher education level, collaboration is vital to research. Whenever required PG students, as a part of their study working in remote locations may be able to consult instructors at the university. For instance, telemedicine is growing rapidly in the medical field and can only be facilitated using broadband or 4G level connections.

Market value & category-wise growth
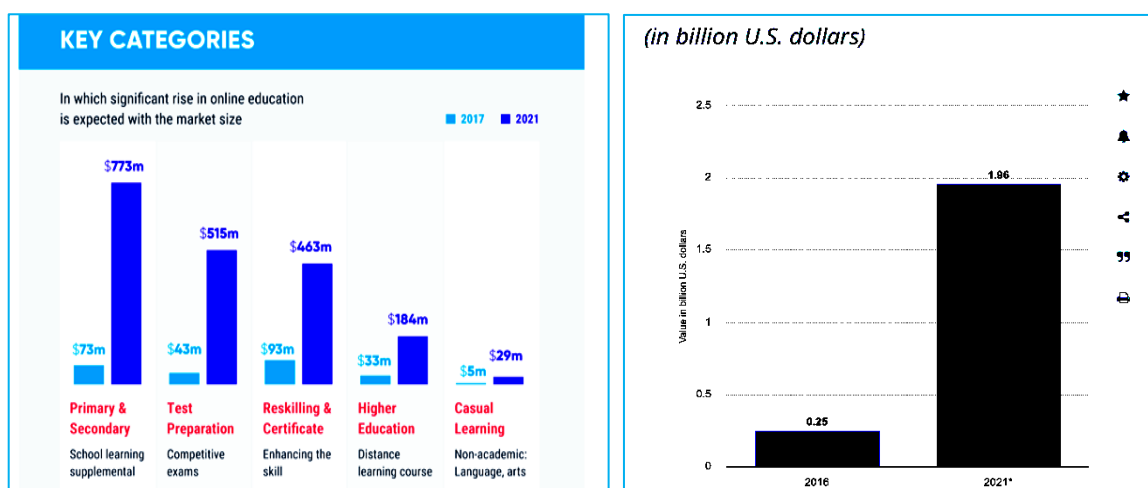
This data described the value of online education market across India about 52% from 250 million dollars in 2016.

The current USD 247 million online education market is poised to grow at a CAGR of 52% to become **USD 1.96 billion** market in 2021.

Reskilling and Certification is the largest category today at USD 93M and will grow to USD 463M driven by the need for

professionals to continuously reskill and stay relevant in the job market.

The primary and secondary education category, currently at USD 73 million, is likely to grow tenfold to USD 773 million by 2021. The primary and secondary education category has the largest addressable audience with a student base of around 260 million when compared to the other categories.

Going forward, **Test preparation** is likely to grow the fastest by 2021 at an impressive CAGR of 64 percent to become a USD 515 million categories.

Key Categories and Market Structure – Online Education

KPMG in India's research and analysis 2017[79]

According to the KPMG report, highest growth has been seen in the test preparation market

especially in the tier 2 and tier 3 cities where fresh graduates aim to secure a government job

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[79]KPMG in India's research and analysis 2017

for themselves. The higher education sector of the education
    industry is in the incubation

period which implies that there is still a lot of scope for growth
    and untapped potential.

The fact that higher education is yet to adopt the benefits of
    elearning can be held responsible

for it. Primary and secondary education is in the take off stage
    for which the launch pad is ready.

E-learning has already made its place in this section including
    the language learning courses.

There are numerous apps and free access websites that allow the
    users to learn from the

resource of their choice.

Considering the percentage of working population in India, the
    section that has benefitted the most

are the certification courses. The youngsters have taken to these
    courses considering the fact they

 can be done online that is from the comfort of their schedule and
    location as well as budget

 friendly fees. These courses and certificates give an edge to the
    young working population to step

 into the global market.

Current market scenario

Consumption (Demand)

- Current user-base for online education largely consists of – (i) school students and (ii) working professionals
- Volume-wise contributions of students and working professionals differ across categories. Primary and secondary supplemental education category comprises of students only, whereas reskilling and online certifications category is dominated by IT professionals.[4] Test preparations witnesses a mix of both, with students as the dominant user-base.

Online platforms (Supply)

- Test preparation category has a presence of multiple medium and small sized players, while reskilling and online certifications is dominated by large sized players offering a wide range of product offerings
- Players typically cater to both primary and secondary supplemental education and test preparation categories simultaneously.

Product offerings

- Certain categories are dominated by standard courses, whereas others require adaptive, innovative course modules
- Higher education, reskilling and online certifications offer standardized product offerings resulting in a degree or certification
- Primary and secondary supplemental education and test preparation categories require highly customised offerings.

Like any other industry even the e-learning industry ha she supply
    side, the demand side and the

products that are being produced and consumed. As for the demand side, the reskilling and

primary & secondary schooling are the major consumers. Catering to the consumers these two

 segments have grown dramatically.

Key categories: Market size & key characteristics
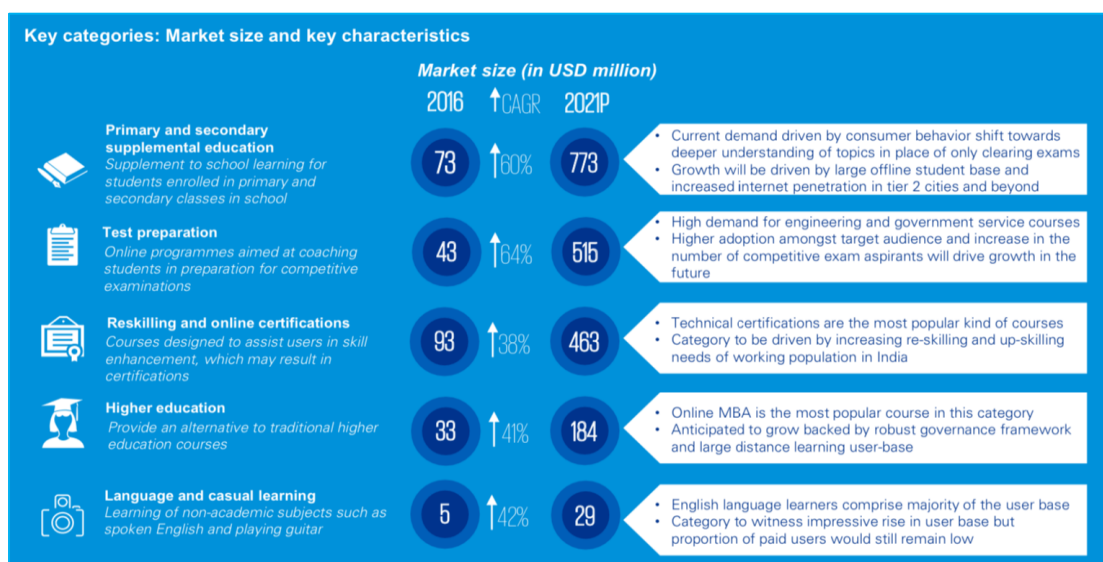
Segment Insights

The E-learning online education market is primarily segmented into **primary and secondary supplemental education, test preparation, reskilling and certification, higher education, and language & casual learning.**

- A surge in demand and change in consumer behavior towards detailed learning are the driving factors of growth in online primary & secondary supplemental segments especially from tier II and tier III cities. This segment was valued at INR 11.99 billion in 2018 and is expected to reach INR 123.65 billion by 2024, expanding at a CAGR of ~46.48%.
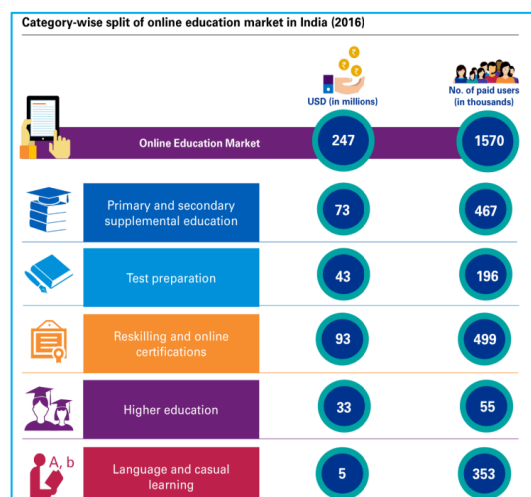
Education: Conventional to Digital

- The online test preparation market is expected to reach INR 94.75 billion by 2024, expanding at a CAGR of ~50.84% during the 2019-2024 period. This segment is expected to be the fastest-growing segment in the online education market, owing to growth in improved Internet infrastructure, increased penetration of digital payment methods, and career-focused population.

- The demand for reskilling courses is picking up because of growing business landscape has extended the skill-gap among employees.

  The online reskilling and certification market is expected to reach INR 93.81 billion by 2024, expanding at a CAGR of ~36.95% during the 2019-2024 period.

Indian Education Ecosystem

	Schooling	Higher Education	Vocational Education & Skill Development	Ancillary Segments
Segments	Early Childhood Education (Pre-schools)	Graduation (General & Professional)	Vocational Education in Manufacturing	Test Preparation and Tutoring
	K-12 Schools	Post Graduation (General & Professional)	Vocational Education in Services	Content: Textbooks and e-Learning
		Research (PhD.)		Allied Services etc.
Market Opportunity	Market Size: $52bn	Market Size: $15bn	Market Size: $5bn	Market Size: $28bn
	CAGR: 14%	CAGR: 20%	CAGR: 20%	CAGR: 22%
Regulations	ECE: For Profit K-12: Not for Profit	Not for Profit	For Profit	For Profit

The table shows that schooling segment in India has a market size valued at 52bn USD growing at a compounded annual growth rate of 14%.

The higher education segment is valued at 15 bn USD growing at a CAGR of 20%.

The vocational training segment is still in the expansion phase valued at only 5bn USD. Although the growth prospects are huge at 20% CAGR.

And the elearning and allied services segments is valued at 28bn USD.

Educational Infrastructure		
Schools (K-12) 1.5 mn	**Colleges: 35,539** Universities*: 751	**Vocational Training Centers** 22,000
Govt. 1.1 mn / Private 0.4 mn	Govt. 8,000 / Private 28,283	Govt. ITI: 2,571 Polytechnics: 9,900 / Pvt..ITI 9,673
No of Students: 260mn	No of Students: 29mn	No of Students: 4.5mn
Annual Intake 18 mn	Annual Intake 5 mn	Annual Intake 3 mn
Additional Capacity Required 40 mn	Additional Capacity Required 20 mn	Additional Capacity Required 20 mn
Additional Requirement for Teachers- 2 mn	Additional Requirement for Faculty- 1.7 mn	Additional Requirement for Trainers- 1 mn
Additional Resources US$60 bn	Additional Resources US$100 bn	Additional Resources US$40 bn

India has one of the leading education systems in the world. It has the world's largest population - about 310 million attending various classes at school, between the age bracket of 6-17 years. At the age of 5, a typical Indian student is introduced to formal education. As a fundamental right, the "Right to Education" (RTE8) Act provides free and compulsory education for all children in the age group of 6 to 14 years. According to the UGC (University Grants Commission) in 2016, India hosted 751 universities and over 35,539 colleges. Over 29 million students enrolled in the Indian Higher Education systems through the distance education model, which is almost a quarter of the total students. The Indian education market, currently estimated at the US $100 billion, is expected to reach US $180 billion by 2021.

India has around 520 million people in the 25 to 59 age bracket which constitutes the working population; this is expected to increase continuously. The best part is that every third person in India is a youth and India is also blessed with a demographic bonus; These favorable demographics bring in vast economic opportunities. However, the ability to grab these opportunities depends on how successfully India addresses these challenges of the Indian education system. The major concern of the education sector is a shortage of trained teachers, capacity constraints &

poor infrastructure. The pay-scale in this sector is very low as compare to other sectors and so is the availability of jobs. These are some of the reasons that have contributed to this shortfall.

Benefits of E-Learning in education to the stakeholders

For the stakeholder in education, the benefits that happen through e-learning are students, government, employers, and employees.

Stakeholders	Benefit
Students	✓ Enlarge access to education, ✓ Global knowledge sharing ✓ Feasibility of content delivery, ✓ Combination of ICT and multimedia ✓ Blending of work and education, ✓ Learner —centric approach ✓ Improvise-quality of education.
Employer's	✓ Increase training quality, ✓ Cost effective strategy , ✓ Elevation of employee skills ✓ Enlarged employee efficiency ✓ Developing of a new learning culture, ✓ Sharing of costs and of training time with the employees, ✓ Increased portability of training.
Governments	✓ Increase the capacity and cost effectiveness of education and training systems, ✓ To reach target groups with limited access to conventional education and training,

Stakeholders	Benefit
	✓ To support and enhance the quality and relevance of existing educational structures, ✓ To ensure the connection of educational institutions and curricula to the emerging networks and information resources, ✓ To promote innovation and opportunities for lifelong learning.

Significant Market Trends

Gamification is one of the most widespread trends among online education providers in the market. This is to encourage learning among students through immersive experiences. This is usually done through simulation of concepts, level advancement badges, and incentive-based learning. These are driving forces for user engagement on online education platforms. Online learning companies, these days, are continuously competing to offer distinguished products to the target consumer, by offering value-added services with regular programs & courses. VAS (Value added services) like Group discussions, internships, Career counseling sessions, and live projects are being offered along with regular courses to enrich users' experiences.

The growing trend of digital classrooms

Technology has brought in a revolution in the way we learn. Technology is helping solve the problems of the learnability of the student, scalability, and quality of education. Teachers can now reach the full classroom virtually through digital screens, enabling each child to receive the base content digitally. Flipped classrooms attract higher student engagement as it combines various instructional styles. Through this modern approach, every student gets exposure to a world-class education, something that was just not available in a chalk and talk approach.

Learning on the go – Facilitating students to study at their convenience anywhere anytime

The new trend here will be personalized learning based on an anytime, anywhere basis. Through self-learning, the front is still on the infant stage due to a lot more school involvement of a student. A typical student reaches home only at 2:30 pm relies on the neighborhood tuition center for the completion of his homework and concept clarity.

Learning at the speed of student's need – Access to online learning material through various devices

Nowadays, due to technological advancements like multimedia, hi-tech networks the education sector has emerged as a fast-developing field. Another prominent result of the use of technology in education is that there is an extensive change in the teaching and learning methods, styles, and content across many schools in India. Today, students learn and use websites wherein they can submit and review their assignments regularly and without any hassles. When a school includes such facilities in a digital learning environment, the classroom becomes much more comfortable and welcoming to students.

With digital elements & computers in classrooms and tablets in their bags, students find studying more meaningful and enjoyable. Furthermore, considering that todays students are usually surrounded by mobiles, iPads, and computers bringing the same technology into the classrooms makes them feel comfortable and at ease with.

Video-based learning picking up pace in India

Video-based learning is growing at a fast pace and making education entertaining, engaging, and exploring. Children are now more excited and operative with interest to manage the showcase via their intelligence, exploring the weak techno skills of teachers and assist them in public with pride, honor, and recognition. Now the classes are student-friendly, student-operated, and info-packed. The interactive featurekindles learning with leisure, creativity, entertainment and funthrough the innovative Apps, videos,

podcasts, interactive software, eBooks, and online interactive electronic boards.

The popularity of online courses – MOOCS & Other distant learning programs

India is the second biggest market for MOOCs in the world, after the USA when we talk about the popularity of MOOCs (Massive Open Online Courses). It isexpected however that India will super-pass the USA in forthcoming years. Our country has the 2nd largest population in the world after China. It ranks third in terms of university enrollment worldwide. USA and China are first and second respectively for university enrollment at present times but this may soon change.

The method of learning through MOOChas opened the path for numerous Indians and allowed them to become a part of the educational revolution. Learners get the opportunity to learn from high-quality study material in form of videos and notes with the help of internet connectivity.

There are two foremost reasons of why MOOCs is an excellent idea for a country like India.1. There are millions of Indians who live in poverty here and are unable to afford or gain access to higher education and

2. Secondly there are more applicants than seats in the Indian Universities.

Game-based learning - a buzz in the K12 sector

Game-based learning develops an atmosphere where the studentsare able to easily relate themselves and get involved next the learning process. The world we live in today is harvesting children who are very well aware of the developments in their surroundings as well as their skills and abilities.

Transforming the k-12 sector, game-based learning undoubtedly will revolutionize the education world products and give us a better self-trained gen-next

The online education market expansion in India:

Online Education Market in India

Expecting to grow from $247 million to

$1.96 billion

by 2021

GROWTH DRIVING FACTORS

Affordability	Availability
Online education is much affordable compared to offline, almost 53% cheaper.	Beneficial for areas where the quality of offline education is low. 10 million enrollments is expected by 2021.
Employability	Government Initiatives
Industry relevant training can be acquired for the better job opportunity.	Plans such as Digital India helps enabling infrastructure needed for students to study online.
Smartphone	Internet Penetration
Usage Expected to grow 180 million new smartphone users by 2021.	Nearly 735 million internet users are projected by 2021.
Young Population	Disposable
46% population is young, higher acceptability of online channels.	Income Expected to grow 55% by 2020.

DIFFERENT TECHNOLOGICAL TRENDS OF E-LEARNING

The technological trends of e-learning today are enormous and growing at a very rapid pace. In this competitive world every day, some new trend is emerging to provide good learning techniques to the learner, among the popular technological e-learning trends some are listed hereunder: -

1. **Mobile Learning** : Mobile learning is the ability of an individual to obtain or provide educational content on personal pocket devices such as PDAs, Smartphones, and mobile phones. These devices with access to an internet connection or with the availability of the resources on themselves will be a great source of e-learning. Today everyone has smart mobile phones on which huge memory and faster internet availability can be achieved and this makes the user learn anything he desires at any time and in any place. These devices are portable. And it seems thatthey are a companion the user and not a hurdle to carry them from one place to another. Mobile learning apps are also a great source of this kind of learning. Mobile learning has a great role to accomplish the success of e-learning not only in a country like India but also in many developing countries of the world.

2. **Microlearning** :It is a way of teaching and delivering content to learners in small, very specific bursts. The learners are in control of what they are learning and when they are learning. Typically designed and delivered in rich media formats, it is a learner-centric approach that provides just-in-time training that is available on multiple devices. All these aspects:

    Mobile phones are considered to be the best platform for e-learning because:

    o   High impact

    o   Affordable and agile

    o   Wider application

    o   Shorter development cycle

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o   Easy to update.

3.   **Internet of Things (IoT)** :IoT refers to the ever-growing network of physical objects around us which hold unique IP addresses for internet connectivity. It is also the communication that occurs between these connected objects and other internet-enabled devices and systems. It includes not only the traditional things like desktops, laptops, smartphones, tablets, etc. but also all other things that utilize embedded technology to communicate and interact with the external environment via the internet. Here IoT can be a great tool for the learners' instant learning for like daily study exercises, daily news, or any information study the learner instantly plans to learn. In this kind of technology, the learner will be assumed like an object in the whole system, where the system connected will detect the new updated and specific learner IP and gives him all the updates he desires from the whole network of physical devices or objects in which he is connected.

Some major benefits of IoT in the case of e-learning can be listed as follows:

o   Continuous updates to learners

o   The learner is part of the learning system as an entity

o   Continuous tracking of learners by the system

4.   **Cloud-based E-Learning** :This type of e-learning is creating ripples in the field of education and business. These e-learning systems are hosted on the internet and can be easily accessed by logging into a service provider's site. Rather than installing all the software and course on a user's or learner's computer, the instructional designers will simply use their internet browsers to upload course content, create new courses, and communicate with learners and users directly. This is all done by a learner management system, which also gives the designer the ability to store information on the cloud, which can be remotely

accessed by other, approved users. here are some notable advantages of using this type of e-learning methodology. They are:

o   Faster deployment

o   Potential to reach masses

o   Easier to maintain

o   Carried all the time

o   Easy to use

o   Learner oriented service request

o   Cheap

o   Just in time learning

o   Cost predictability

o   More storage space

o   Fully customizable and scalable

5. **Gamification** :In e-learning, gamification is a hot topic today with lots of good reasons. It has proven to be useful in helping learners further comprehend and apply new information they want. This type of e-learning is through games and it depends on the program and the audience's desires. Children can benefit more from this kind of e-learning because it creates interest in them and makes them do it again and again for a long time. Gamification not only helps online learners acquire knowledge and skills more effectively but also allows them to retain the information and commit it to long term memory for future use. Some of the important benefits of Gamification in e-learning are:

o   Easy instant deep learning of things

o   Saves lots of time for learners

o   Huge collection of information

o   Very rich study resources

6. **Adaptive E-Learning :**Adaptive e-learning uses computers as interactive teaching devices. This methodology arranges the allocation of human and mediated resources according to the unique learning needs of each learner. This is also known as intelligent tutoring and it has its origin in artificial intelligence and started gaining its popularity in recent decades. The adaptive learning system can be implemented on the internet for use in distance learning and group collaboration. The field of distance learning is greatly incorporating the aspects of adaptive learning. Adaptive learning has been adopted in several different forms of educational systems – for example, hypermedia, intelligent tutoring systems, computerized adaptive testing, and computer-based pedagogical agents. Some of the advantages are:

    o   Best learning experience

    o   Video explanation

    o   More information in less time

7. **Augmented Reality:** This technology superimposes a computer-generated image on a user's view of the real world. It is related to a more general concept called mediated reality. It is a great boon technology for the students or learners in general. Whenever the learner wants to know more of the things he is seeing in the real world, using a device like a mobile phone on which the augmented reality software is enabled, the learner can get all the information regarding the object. Technology needs devices, the internet, and the software of augmented reality. This technology has a good future in e-learning. This technology has a long way to go for making the learners learn things just by projecting the device. This technology has just introduced in 1962. Google glass is a very good example of augmented reality. Augmented reality is very good for:

    o   Easier Campus Navigation

    o   Improved In-Class Experiences

    o   Increased Intellectual Discovery

o   Better Accessibility

o   More Powerful Communication

o   Insightful Data

8.   **Video E-Learning** :This kind of learning helps the learner to grasp the content by watching the videos. When a learner wants to get an idea on some specific topic in detail he visits youtube.com for sure. This kind of e-learning gives a very quick idea and helps to understand things with multimedia effects. Youtube.com is a rich source of video e-learning content and in the same way TV, CD's and storage devices with educational videos paves the way to this kind of e-learning and these days this kind of learning is in full swing as it saves lots of time of the learner compared to reading line by line full stuff on the computer or any other electronic device and also it might take little concentration of the learner than to reading stuff. This serves as a very effective medium of e-learning. Some benefits of video e-learning can be as follows:

o   Better learning experience

o   Better learning environment

o   Takes to Mastery level

o   Instant feedback

o   Helps to remember for a long time

9.   **Beacon E-Learning** :This is one more boon technological trend to e-learning. This beacon e-learning or beacon technology is a wireless device that transmits signals to other nearby devices via low-energy Bluetooth connections. This is used as an Indoor Positioning System (IPS). These IPS beacons can wirelessly locate people and objects within a specific range and then trigger an action on a nearby wireless device. Most importantly this is safe and secure, only accessible through paired applications, and easy to download and use. In these modern times, almost 99% of college students have smartphones and they can use their phones

for effective e-learning. Some great benefits of this technological trend are:

o   Easier Campus Navigation

o   Increased Intellectual Discovery

o   Insightful Data

o   Improved In-Class Experiences

o   More Powerful Communication

o   Better Accessibility

10. **Artificial Intelligence** :This technological trend can also be a great shaper to the e-learning world. Artificial Intelligence and robots are not the same things. It is something like intelligent software which is designed to take some intelligent actions reading the entire environment around it. This can produce a very good instructor which helps in making each student a good expert in their field. Some latest outcome in artificial intelligence learning instructors are like SIRI and VIV, these are software which will answer simple queries to many complex queries of the learners. The involvement of artificial intelligence in e-learning helps the learner to take very wise decisions and quality resources, which in turn helps the learner to excel and make his achievements at a faster phase. Some major benefits of AI in the case of e-learning can be as follows:

o   Provides expert tutors for learners

o   Automated teaching

o   Huge and rich information

Conclusion

Although education is increasingly becoming technology-driven, it is important to note that such digitization is commonplace only in urban areas, primarily in metros, mini-metros, and Tier 1 and 2 cities. There are significant challenges in the mass adoption of education-oriented, technology-based products and

services which are restricting further innovation in this space.

Policymakers are making strides in the right direction by taking a proactive stance on the mass adoption of digital learning. One such example is the launch of the Indian MOOCs platform - "Swayam". The All India Council for Technical Education, or AICTE, announced that it may permit up to 15% of the credits of a degree to be obtained through MOOCs. While there are positive trends regarding the adoption of digital learning in pan India, poor internet connectivity

in smaller towns and semi-urban areas forms the primary impediment towards widespread adoption of this technology-driven learning. The massive potential of learning tools such as gamification, video-based learning, competency training, etc. can only be realized once these issues are circumvented. It is expected that in the coming decade, India will see a far-reaching transformation that will be driven by digital learning players truly taking technology-driven education to a Pan-Indian level.

http://www.iraj.in/journal/journal_file/journal_pdf/12-376-15024521691-6.pdf[80]

https://acadpubl.eu/jsi/2018-118-18/articles/18e/27.pdf[81]

https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf[82]

https://www.researchandmarkets.com/reports/5024958/online-education-market-in-india-2020-2024[83]

https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf[84]

https://www.hughes.com/resources/why-e-learning-has-promising-future-india[85]

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[80] http://www.iraj.in/journal/journal_file/journal_pdf/12-376-15024521691-6.pdf
[81] https://acadpubl.eu/jsi/2018-118-18/articles/18e/27.pdf
[82] https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf
[83] https://www.researchandmarkets.com/reports/5024958/online-education-market-in-india-2020-2024
[84] https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf

https://smartnet.niua.org/sites/default/files/resources/Whitepaper-on-Digital-Learning-Market-in-India.pdf[86]

https://www.prnewswire.com/news-releases/indian-online-education-market-outlook-to-2024-online-primary--secondary-supplemental-education-test-preparation-reskilling--certification-higher-education-and-language--casual-learning-301041959.html[87]

https://fedena.com/blog/2018/10/future-of-online-education-in-india-by-2021.html[88]

https://inc42.com/resources/future-trends-digital-education-india/[89]

https://www.technavio.com/report/online-education-market-in-india-market-industry-analysis[90]

4.3 Govt. Initiatives for E-learning

1. INTRODUCTION

E-learning (Electronic learning) is an online learning & teaching method which includes multimedia voice & text etc. & uses ICT (Information and Communication Technology) to deliver content through an external driver or an Individual system. The best feature is that it can be easily & comfortably accessed from any place irrespective of time. E-learning content is enriched with multimedia stuff that Includes Videos, Notes, Online lectures, texts, etc. Along with course material It provides self-assessment tests like MCQs, quizzes, and quick revisions. E-learning is gradually becoming part of the daily learning cycle of the present generation. This type of learning enables teachers/tutors to deliver their knowledge in various

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[85] https://www.hughes.com/resources/why-e-learning-has-promising-future-india
[86] https://smartnet.niua.org/sites/default/files/resources/Whitepaper-on-Digital-Learning-Market-in-India.pdf
[87] https://www.prnewswire.com/news-releases/indian-online-education-market-outlook-to-2024-online-primary--secondary-supplemental-education-test-preparation-reskilling--certification-higher-education-and-language--casual-learning-301041959.html
[88] https://fedena.com/blog/2018/10/future-of-online-education-in-india-by-2021.html
[89] https://inc42.com/resources/future-trends-digital-education-india/
[90] https://www.technavio.com/report/online-education-market-in-india-market-industry-analysis

forms on digital platforms. Almost every educational Institution and University are coming forward to invest in E-learning through ICT. This is made possible due to the technological advancement in the education sector (Cheung and Huang, 2005). Many leading universities and institutions in India have started concentrating more on technology-enhanced learning processes and teaching. It helps them adopt high class IT infrastructure and motivate their instructors to embrace technology for developing & preparing e-learning modules. The government has also taken many initiatives by spending more money and allocating more resources to improve IT infrastructure and promote ICT for E-learning. Initiative on digitization has also lead to a gradual increase in the number of internet users every year. As per "*Internet in India – 2015*" a report released by the IMRB Internationalshows that India holds the 2nd place by superseding USA in the number of internet users.

2. E-Learning Growth in INDIA

In 2014 The enrollments for ODL (Open and Distance Learning) has reached 5.42 million and by 2019 it is expected to reach more than 8.79 million. The Distance learning market is growing at a CAGR of 10.16%. E-Learning enrollment& its steady growth in India is majorly dependent on the following 3 key elements:

2.1 Convenient Learning and Quality Education:

When it comes to employment for Fresher graduates in India, they face a highly competitive employment marketplace as compared to standard industry employment skills. Due to this reason, they start looking for industry specific certifications to enhance their technical & professional skills and keep themselves updated. It proves to be a boom for them as courses and certificates offered by E-Learning to the employees enable them to obtain a specific certificate in the most convenient way and timing. The important benefit of these courses is

that they can be taken up remotely without hindering their jobs.

2.2 Increased Government Initiation:

Constant actions are taken by Govt. Of India to regulate and standardize the standard & level of education imparted through distance learning. It is to keep pace with the widespread introduction of e-learning programs in educational institutions and universities across the country. The Indian government has taken many initiatives on E-Learning programs like SWAYAM, NPTEL, e-PGPathshala, e-GyanKosh, CEC, FlexiLearn, etc.

2.3 Continuous Demand from Corporate Sector

Many organizations want their employees to be updated with the latest professional skills and technology to compete in the market/industry. This requirement makes them choose & adopt E-learning methods for enhancing their skillsets and reduced training costs. Several organizations have entered into partnership ventures with institutes that offer E-learning modules due to increasing demand in the distance learning sector.

3. DEMAND OF E-LEARNING IN INDIA

The total number of internet users in India was 167.2 million in the year 2013, which grew up to 283.8 million users in 2016. According to a report by Docebo, the e-learning market has reached $35.6 billion in the year of 2011. According to the five-year CAGR, the aggregate growth rate is 7.6% in which Asia has the highest rate of 17.3%, followed by Eastern Europe (16.9), Africa (15.2%), Latin America (14.6%) and many other regions of the world also have higher growth rates.

Due to its easy accessibility at anywhere, to anyone, and anytime, both the corporate world and students in India are very well attracted to the E-Learning education system. As per one recent study, India stands

2nd in the largest number of online courseenrollment after the USA (United States of America). With over 1,55,000 enrollments, which is 15%, India stands second out of a total of 1.2million worldwide enrollments, the USA stands first at 32%. India has a promising future for e-learning due to the rise of technology, a positive perspective of people, and the expansion of public and private sectors towards e-learning.

3.1 USE OF E-LEARNING IN EDUCATION

E-learning has changed the entire ball game of the education sector. E-learning plays a very vital role in the education sector, mainly it consists of developing, delivering, sharing quality course content, in an efficient & effective manner. It helps to communicate and acts as a bridge between students and tutors across the globe. E-learning adds to various aspects like research, career-boosting, improved literacy rate, knowledge sharing, etc.(Mandal & Mete 2012). E-learning also helps in cost-effective gains in terms of reducing training time, hiring of multiple trainers, the printing of course materials, reducing travel and accommodation costs. It provides an alternative to the paper-based learning, traditional classrooms to both students and teachers. E-learning is an effective way for various organizations to reduce their carbon footprints significantly. As observed in a study done by Open University that on average, the provision of distance learning courses produced 85 percent fewer CO2 emissions and consumed nearly 90 percent less energy per student than conventional campus-based courses.

4. e-LEARNING INITIATION BY INDIA GOVERNMENT

Being a developing country India is positively concentrating on the education sector to go to the next level. The Indian government has taken a lot of

initiatives to promote education through various projects which consist of distance and online education programs. In 1956 UGC (University Grants Commission) was established to enhance standards of higher education and to determine, coordinate and maintain provisions & resources in a well-organized manner. UGC provides various degree programs in different streams & disciplines through rich multimedia content. The Indian government has come up with various initiatives with help of ICT for the immediate & long-term future and set up a National Mission on Education. Under this mission planning, it has also launched a dedicated satellite in 2004 for promoting online education. This satellite was launched with the motto to bring revolution in both quantitative and qualitative revolution in e-learning / online learning. Govt. has also taken many innovative steps and launched projects like "SWAYAM, NPTEL, Meta-Universities, e-GyanKosh, e-PG Pathshala, Flexi Learn, Consortium for Educational Communication (CEC)" and many more to promote an e-learning environment.

4.1 SWAYAM:

SWAYAM stands for Study Webs of Active-Learning for Young Aspiring Minds. SWAYAM was launched on 9th July 2017 by the Ministry of Education. It is an initiative under the "Digital India" campaign undertaken by the Government of India in 2015. The platform has been designed to impart quality education to school students, undergraduates as well as post-graduate students in India. It was affordable and meant to reach more than 10million students of different backgrounds across the length and width of India. SWAYAM provides quality content, discussion forums, online lectures, quizzes, and assessments to students. It offers a self-learning platform not only for students but also for drop-outs and different professionals. SWAYAM currently offers three courses namely Computer programming, Quantum mechanics and computation, and thermodynamics. Quantum Mechanics and Computation is offered by

UC Berkeley, Computer Programming and Thermodynamics by IIT Bombay.

Under SWAYAM, the portal has free printable and downloadable study materials for learner's along with video lectures, discussion forums, and online tests for more than 1600 courses. After successful completion of the course, students can get a certificate in exchange for a token fee.

Students can easily access the website version at https://swayam.gov.in or download the mobile app from Google Play Store or AppStore. Registration at Swayam is quite simple. You can simply register through a valid email ID or Facebook or Google plus account.

4.2 NPTEL

The National Programme on Technology Enhanced Learning (NPTEL) is to provide E-Learning through online web courses to various streams of education like Technology, Engineering, Management, Sciences, and Humanities, etc. and this project is being funded by MHRD (Ministry of Human Resources Development). Currently, 70 courses are being offered which include Undergraduate, postgraduate, and Doctorate Programs. There are 140 courses in progress and they will be circulated through the internet.

As a joint initiative, the project initiative has been promoted by seven IITs and IISC Bangalore, and many other leading institutions. The main aim of this project is to enhance the quality of education through web-based courses and curriculum-based Audio-Visuals.

4.3 META-UNIVERSITY

Meta University concept was introduced by the Indian government in 2012. It was first started in Delhi for Universities like Delhi University, JamiaMilliaIslamia, IIT, and JNU. The basic purpose of this program is to make use of

resources more efficiently and effectively by sharing the learning material among various colleges with the help of advanced technology. This would facilitate students to pursue various courses via flexible learning platforms. This concept makes ideal use of available resources, creates synergy between the institution & its activities. This concept serves as a platform for group efforts, communication, and mutual understanding between the Universities. The consequences of this concept are very positive like wide reach, new programs, going beyond autocracy of geography and tradition, etc.

4.4 E-GYANKOSH

E-GyanKosh is the project developed and implemented by IGNOU (Indira Gandhi National Open University). E-GyanKosh serves as a national repository to store, distribute and share learning resources in the digital format. The course materials that are offered by IGNOU can be accessed through E-GyanKosh for free of cost and also can be downloaded by doing a one-time registration process.

4.5 MOOCs

Massive Open Online Courses are free online courses on demand. It enables learners to access and learn according to their choice of place and time with the use of the internet. India stands second in the enrolment of MOOCs which urged the Indian government to launch the project called "Swayam" to provide quality and affordable education to the students, the USA being 1st.

4.6 NATIONAL E-LIBRARY'

Along with SWAYAM, the Government of India has announced another project termed as "National E-Library". This was creating an online digital library that will have resources from the nation's top universities and institutes. The

library could be accessed by every learner via the Internet. The National E-Library was started in the academic year 2015. This Initiation of the Indian government was revolutionary, any learner with internet access can utilize National E-Library facilities from anywhere, anytime.

4.7 FLEXILEARN

FlexiLearn is the method of self-learning where academic advisors and course guides act as mentors. FlexiLearn also assists learners to make use of IGNOU learning materials free of cost. It provides online access to more than 75 courses for both undergraduates and postgraduates.

4.8 CONSORTIUM FOR EDUCATIONAL COMMUNICATION (CEC)

CEC (Consortium for Educational Communication) serves as a nodal agency at a national level to fulfill the educational needs of the nation with help of electronic media. CEC is designed for undergraduate students; it comprises more than 15000 audio/video course materials for 50 subjects. The contents of CEC are web-based and are developed after extensive multimedia research by different universities and institutions across India. It is also named "Development of Courseware e-Content for Undergraduates" by NME-ICT of MHRD. There are around 22 media centers dedicated to working under one umbrella to accomplish its goal of the development of quality content.

4.9 E-PG Pathshala

Under the supervision of the Ministry of Human Resources Department (MHRD), the University grants commission started this project called E-PG Pathshala which is specially designed for post-graduates. E-PG Pathshata is one of the wings of the National Mission on Education through ICT (NME-ICT). It offers about 77

subjects with standardized content and quality as its motto. It covers various disciplines like arts, social science, linguistics, and languages, etc. with Interactive & high-quality content. The E-contents that are developed under this project are open to access through Learning Management System (LMS) as well as the Sakshat portal. Under this initiative, more than 700 e-books for over 68 postgraduate courses are available for free for students.

The online portal is loaded with high-quality text content, videos, illustrations, documents tutorials, PDF files, etc.

There are the 3verticals under the e-PG Pathshala module namely:

1. e-Pathya offers offline and distance-learning courses for postgraduate students is one of the verticals of e-PG Pathshala which is a software-driven course/content package that facilitates students pursuing higher education post graduate level in the distance as well as campus learning mode. It also facilitates offline access.

2. e-Adhyayan consists of video contents and e-books are a platform to provide 700+ e-Books for the Post-Graduate Courses. All the e-bookshave been derived from e-PG Pathshala courses. It also facilitates a play-list of video content.

3. MOOC (Massive Open Online Courses) UGC courses are offered under the SWAYAM portal. UGC-MOOCs is one of the platforms that produces a course on Post Graduate subjects in SWAYAM (Online Courses, An MHRD initiatives). UGC is one of the national coordinators of SWAYAM while INFLIBNET is the technical partner for UGC-MOOCs.

4.10 DIKSHA

DIKSHA, the advanced digital learning initiative was taken by the Ministry of Education in September 2017 for teachers from classes 1 to 12. The digital portal has been mainly designed for teacher education but it is also available for students who want to connect to the teachers' community. DIKSHA offers:

-curriculum

-lesson videos,

-worksheets

-training courses,

-assessment tests for teachers.

One of the unique features of this platform is the QR code. Students can easily scan this QR code to gain access to a huge library of learning materials and eBooks.

There are more than 80,000 eBooks that have been made available for the students of 12th class in multiple languages. Android and iOS users can download the application from the Google Play Store and iOS app store. Web users can visit and register at the official website at diksha.gov.in

4.11 Swayam Prabha

Swayam Prabha was conceptualized by the Ministry of Education that consists of a collection of 32 DTH channels that telecast educational content 24x7 for students across India. Each day, the channel telecasts a new content of 4-hour duration. The content is shown 5 times a day so that students can select the time and watch the programs at their convenience.

Contents are available for class 12th, UG, and PG students. Detailed courses are offered through SWAYAM on various disciplinary courses as well as MOOCs courses.

Students can visit www.swayamprabha.gov.in for details regarding the free installation of a set-top box and other information.

4.12 National Digital Library of India (NDLI)

Ministry of Human Resource Development (MHRD) under its National Mission on Education through Information and Communication Technology (NMEICT) has initiated the National Digital Library of India (NDL India). It isthepilot project to create a framework of virtual repositorythat is a virtual library of learning resources. It has a single-window search facility.The National Digital Library (NDLI) was developed under NME-ICT by the Ministry of Education through NME-ICT. It consists of academic contents in multiple disciplines from school to post-graduation level. This all-purpose platform has beendesigned for students of all classes and ages,educationists, librarians, researchers, professionals teachers, learners, and any other users.

The online platform is available 24x7 in more than 70 Indian languages. A wide variety of learning resources are available including thesis, eBooks, videos, documents, manuscripts, and many more.

The feature of filteredsearching is used to allow focused search so that students can find out the apt resource with the least effort and in minimum time. NDL India is designed to hold the content of any language and provides interface support for leading Indian languages. It is being arranged to provide support for all academic levels including researchers and life-long learners, all disciplines, all popular forms of access devices, and differently-abled learners. It is being designed to:

-assistlearners to prepare for competitive and well as entrance examinations,

-to allow people to learn and prepare from best practices from all over the world, and

-to facilitate researchers to perform inter-linked exploration from multiple sources.

The pilot project is devising a framework that is being scaled up to content volume and diversity to serve all levels and disciplines of learners. It is being developed at the Indian Institute of Technology Kharagpur.

National Digital Library (NDL) can be accessed through link https://ndl.iitkgp.ac.in[91]

4.13 E-ShodhSindhu

E-ShodhSindhu is a joint venture planned by the Ministry of Education and the Government of India. This is a digital library providing access to e-resources like eBooks, journals, citations factual bibliographies, etc. for higher education.

The e-ShodhSindhu was formed based on the recommendation of an expert committee. MHRD formed it by merging three consortia initiatives that is:

-UGC-INFONET Digital Library Consortium
-NLISTand
-INDEST-AICTE Consortium.
The e-ShodhSindhugives access topresent as well as recorded repository.There are more than 15,000 core and peer-reviewed journals. In addition to it there are also many factual databases and bibliographic citations fromvarious disciplines from a huge number of publishers to its member institutions including centrally-funded technical universities, institutions and colleges that have been brought under the umbrella of 12(b) and 2(f) Sections of the UGC Act.

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[91]National Digital Library (NDL) can be accessed through link https://ndl.iitkgp.ac.in

e-ShodhSindhu platform - Aims and Objectives:

The main objective of the e-ShodhSindhu:

-Consortia for Higher Education E-Resources is to impart access to qualitative electronic resources including

    a.   full-text, bibliographic

    b.   factual databases

to academic institutions at a subsidized subscription rate.

-It is a consortia for Higher Education E-Learning Resources by increasing and strengthening the activities and services offered by the three MHRD-funded Consortia.

-Develop a strong collection of

    a.e-books,

    b.e-journals,

    c.e-journal archives on a continuous access basis.

Academic institutions such as the central universities, state universities and colleges can avail the services.

For registration you can logon to https://ess.inflibnet.ac.in/oes or you can also email at eshodhsindhu@inflibnet.ac.in. [92]

4.14 Virtual Labs

Virtual Lab is a digital consortium founded by the Government of India in collaboration with the Ministry of Education under the NME-ICT initiation. The focal idea is to provide remote access to students for the virtual laboratories.The students should be from

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[92]https://ess.inflibnet.ac.in/oes or you can also email at eshodhsindhu@inflibnet.ac.in.

engineering and science streams from both undergraduate and postgraduate levels.

Conducted by IIT Delhi, this consortium has around 12 participating institutes. The project has more than 700 web experiments and lab facilities conducted under the supervision of experienced faculties.

eLearning is expanding its horizon to provide a unique opportunity toteachers, knowledge aspirants,researchers and students. It has given a platformto collaborate and share their knowledge and learning resources.

4.15 Shodhganga platform

Dissertations and theses are known to be a highly rich source of unique information. Mostly it is the only source of research work that has not found its way into various publication channels. Theses and dissertations remain an under-utilized and untapped assets. It also implies that it is unnecessary duplication and repetition, which is in effect, is the anti-theses of research and wastage of huge resources, both human and financial.

The UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D. Degree, Regulation, 2016) of 5th May, 2016 made it compulsory for the submission of electronic version of theses and dissertations by the scholars and researchers in different universities to allow open access to Indian theses and dissertations to the academic community worldwide. The digital availability of doctoral theses is made sure via centrally maintained depositories. This will improve their accessibility and will help in creation of digital archives. Such an initiative will reduce duplication of research papers and will also improve the quality of research papers.

According to the regulations, the role of hosting and maintaining digital depositories of electronic these is being performed by Indian Electronic These and Dissertation, which is popularly known as "Shodhganga". This digital depository is accessible to colleges, universities and other institutions. The maintenance of this depository is being handled by INFLIBNET center.

The word "Shodhganga" is derived from Sanskrit language. The word consists of "Shodh" and "Ganga". Here "Shodh" means to do research and discovery and "Ganga" is the National river of our country. This name was given to the digital depository of Indian Doctoral thesis. The "Ganga" is the holiest, largest, and longest of all rivers in the Indian subcontinent. This holy river is revered by millions of Indians. It was on the bank of river Ganga, the ancient empires of the Mauryans and the Guptas flourished. Shodhgangarepresents anocean of Indian intellectual output saved in a library hosted and maintained by the INFLIBNET Centre.

TheShodhganga@INFLIBNET is set-up using D-Space. It is an open-source digital repository software. It has been developed by MIT (Massachusetts Institute of Technology) in partnership with Hewlett- Packard (HP). The softwareDSpace uses international standards and protocols.Shodhgangagives a platform for researchers and scholars to store their Ph.D. theses so that it is made available to the entire scholarly community in open access. The repository can capture, index, store, disseminate and preserve ETDs (Electronic Theses and Dissertations) submitted by the researchers. The academic structure of Shodhganga is similar to that of colleges & universities. This facilitates the research scholars while depositing their theses. The categorization of depositing facilities into departments, topics and other

sub-headings makes it easy for depositors to classify their these accordingly.

4.16 E-yantra

E-yantra project was launched by IIT-Bombay. The initiative for this program was taken by the computer science department. This programme was focused on robotics and its application. The aim of this project was to demonstrate the technical capabilities of robots and humanoids. The funding and resources for this programme were provided by Ministry of Human resources, Government of India, under National Mission on Education through ICT (NMEICT).

E-Yantra Project aims to create the next generation of embedded systems engineers with a practical outlook to help provide practical solutions to some of the real-world problems. E-Yantrais sponsored by the Ministry of Human Resource Development (MHRD) under the National Mission for ICT in Education (NMEICT) program.

IIT Bombay considers the 'e-Yantra' as a platform to tap the intellectual talent of young India for creating utility based robotic applications for usage across various applications such as manufacturing, agriculture, defense, and services industries. The overall mission is to grow a rich eco-system of ideas and applications that can propel India's growth curve and productivity through intelligent funneling of robotics in our daily lives. The major thrust of this programme is to build upon the pre-existing knowledge pool, which has been developed by students from various colleges and universities in the area of embedded systems.

e-Yantra Initiatives for Students

1. e-Yantra Robotics Competition: Annual Robotics competition for Engineering/ Science/ Polytechnic colleges. e-Yantra Robotics Competition (eYRC) is

one of a kind for students, who are pursuing their under graduation in the field of science and engineering in various colleges and polytechnics. Teams which will be selected will be given a robotic kit,which will have accessories and video tutorials. The main objective of this kit is to help students learn basic concepts in embedded systems and microcontroller programming. Teams are motivated to compete against each other, while solving real-world problems assigned as "themes".Winners of the competition will be eligible for an internship at IITB through e-Yantra Summer Internship Program.

2. e-Yantra Summer Internship Program: The objective of the e-Yantra Summer Internship Program (eYSIP) is to provide a platform for web-development, image processingand embedded systems to the winners of the e-Yantra Robotics Competition. Under this internship programme, students will get a chance to experience a research environment and they can put on their thinking hats, while availing an opportunity to evolve themselves into confident individuals through discussion sessions by experts, exploratory trips and interactions with market leaders.

The internship opportunity is also provided at e-Yantra Lab, IIT Bombay to the winners of the e-Yantra Robotics Competition.

e-Yantra Initiatives for Colleges

1. Allows colleges to establish robotics labs and give training to teachers.

2. e-Yantra Ideas Competition provides a platform to the students of eLSI college to execute and show their innovative ideas.

3. e-Yantra Symposium brings the eLSI collegestogether for discussions and seminars on how to turn these labs into Innovation Hubs.

e-Yantra Initiatives for Teachers

1. Two-day Workshop on Introduction to Robotics: An introductory workshop on robotics and embedded systems involving hands-on training exclusively for teachers.

2. Task Based Training: A series of interesting tasks based on Firebird V platform blend theory and practical experimentation.

e-Yantra Ideas Competition

e-Yantra Ideas Competition (eYIC) is a competitive format, whose major objective is to promote innovative and creative projects from robotics labs. This competition is being conducted under e-Yantra Lab Setup Initiative (eLSI) in colleges and universities across the country

This initiative aims:

i)   To make sure the sustained use of the robotics labs setup through eLSI program.
ii) To seeks innovative solutions to problems of the real-world from students in eLSIinstitutes across the nation.
iii) To developbachelor of engineering projects in Embedded Systems and Robotics at eLSIinstitutes.
iv) To nurture the culture of encouraging startups at the eLSI labs.

e-Yantra Lab Setup Initiative

eLSI that is the e-Yantra Lab Setup Initiative is the program started off at the college level. Under this program colleges are encouraged to set up robotics labs. This initiative has a special focus on lab infrastructure creation and training of teachers. Under this, the aim is to create an eco-system which is effective and efficient in transmission of engineering education. eLSI provides: guidance and support for establishing robotics labs - three robotic kits are given to each participating college and a two-phased

training for teachers: Two-day Workshop and Task-Based Training.

Two-day workshop

The workshop aims to upskill teachers in Embedded systems and Micro-controller programming. They will be taught about the latest developments in this field, while providing them a real-time experience of the cutting-edge technologies.The first phase of the training will be provided under e-Yantra Lab Setup Initiative (eLSI). Further, teachers will be attending Face-to-face training workshopsand lectures by eminent personalities in coordinating colleges.

Task-Based Training

Under the second phase of Task-Based Training (TBT) module, the under trainingteachers will get hands on experience on Firebird V robot. Also, there will be an online training module for 3-4 months where teacher teams are periodically assigned six tasks. Each task is aimed at learning a specific concept on Embedded Systems and Robotics. The timeline provided is flexible so that teachers with a busy schedule can be accommodated.

4.17 FOSSEE

FOSSEE (Free/Libre and Open-Source Software for Education) is the project that aims to enhance the educationquality in our country. The main objective of this initiative is to reduce the dependency on proprietary software in educational institutions. We have developed and will provide our own tools which can replace those commercial and overly expensiveversions.

The project is part of the National Mission on Education through Information and Communication Technology (ICT), Ministry of Human Resource Development (MHRD), Government of India.

4.18 Spoken Tutorial portal

Spoken Tutorial is a multi-award-winning educational content portal. The beauty of this portal is that a student can learn and master newer software on his own. This portal also provides a streamlined method of self-evaluation. The available courses are self-paced and multi-lingual. All the contents published on this website are shared under the CC BY SA license.

The lucidness and simplicity of our delivery mechanism is our strength. Even a beginner can become proficient in a short period of time. We are confident, that the quality of our content will ensure a sustainable and effective learning at all levels - Basic, Intermediate, and Advanced. Our content requiressimultaneous practice thus ensuring that the learners are actively learning. Many of the softwares used for teaching, are used in various disciplinary fields such as - pure Sciences, Engineering,and several other Under-Graduate and Post-Graduate studies. Alongside these, there are some courses relevant at the School level, too, which help school students to visualize difficult concepts of Math and Science. Our platform can also be used to prepare lesson plans, explain abstract concepts, and give digital assignments to students.

The learning takes place in an organized manner and a disciplined atmosphere. The teaching experts in colleges and institutes can organize their batch of students into groups, who can learn a specific software for ancomplete semester. The ST course that is Spoken Tutorial course can be modified according to the Course/Lab manuals. This helps in systematic learning.One student can learn up to 3 different ST courses if the academic timetable allows so.

Students need to clear an End-of-Course Online test. Certificates are give to those who wish to clear the test and gain expertise in any particular software. These certificates give an upper hand to students at times of placements and job interviews by increasing their employability potential.

https://vnit.ac.in/wp-content/uploads/2020/02/ICT-Initiatives-of-MHRD-Government-of-India.pdf[93]

https://www.meity.gov.in/writereaddata/files/e-learning_r-and-d_projects_initiated_during_xiith_plan_period.pdf[94]

https://acadpubl.eu/jsi/2018-118-18/articles/18e/26.pdf[95]

https://www.abpeducation.com/education-tips/top-8-government-elearning-platforms-for-students-1.1192917[96]

https://vnit.ac.in/wp-content/uploads/2020/02/ICT-Initiatives-of-MHRD-Government-of-India.pdf[97]

https://shodhganga.inflibnet.ac.in/#[98]

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[93] https://vnit.ac.in/wp-content/uploads/2020/02/ICT-Initiatives-of-MHRD-Government-of-India.pdf

[94] https://www.meity.gov.in/writereaddata/files/e-learning_r-and-d_projects_initiated_during_xiith_plan_period.pdf

[95] https://acadpubl.eu/jsi/2018-118-18/articles/18e/26.pdf

[96] https://www.abpeducation.com/education-tips/top-8-government-elearning-platforms-for-students-1.1192917

[97] https://vnit.ac.in/wp-content/uploads/2020/02/ICT-Initiatives-of-MHRD-Government-of-India.pdf

[98] https://shodhganga.inflibnet.ac.in/#

5. Case Study of UnfoldU

India's online education market is set to grow to USD 1.96 billion and around 9.6 million users by 2021 from USD 247 million and around 1.6 million users in 2016.
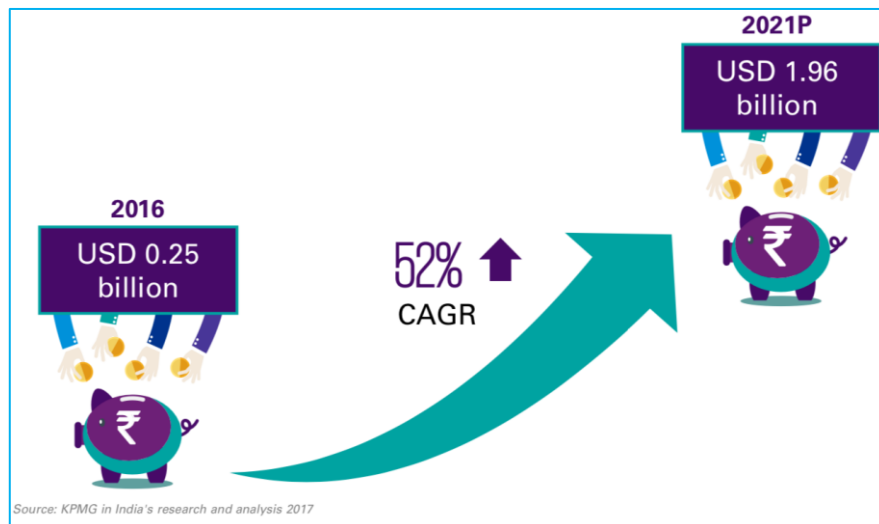
https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf[99]

This sector is growing at an excellent pace with the increased usage of mobile phones and the cheap availability of internet.

IAMAI, World Bank, CNNIC, Techopak Analysis[100]

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[99] https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf
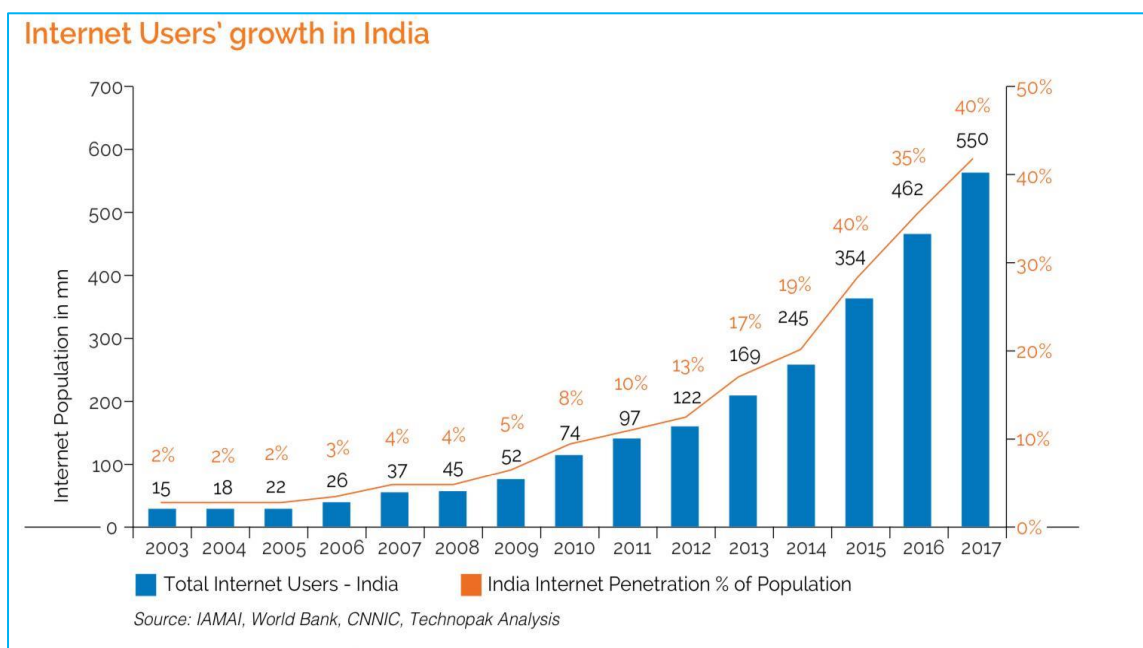
[100] IAMAI, World Bank, CNNIC, Techopak Analysis

Source: TRAI, CNNIC, Technopak Analysis
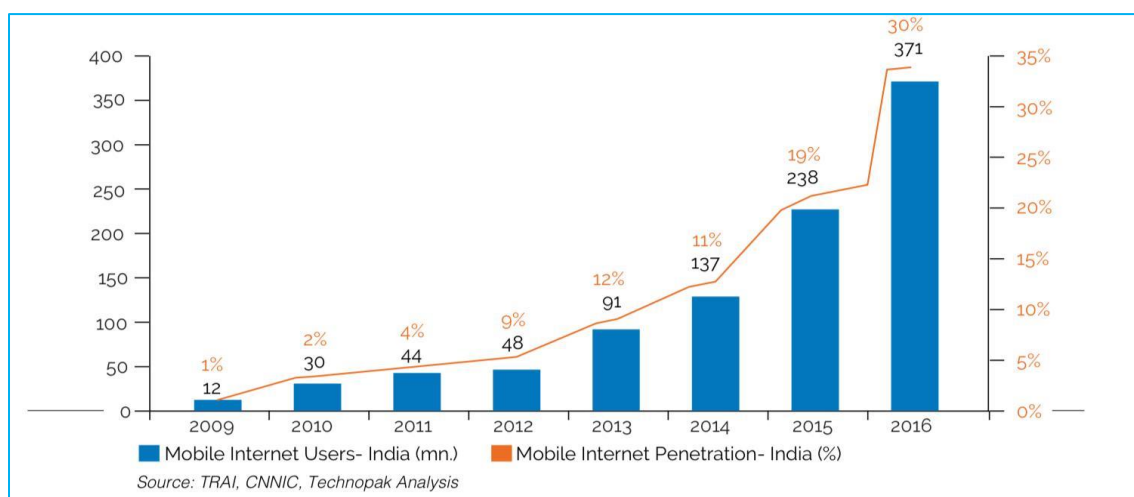
TRAI, CNNIC, Techno Pak Analysis[101]

With the advent of newer technologies like Data analytics and AI, the delivery of education has undergone an evolution. Now, content can be personalized according to the needs of the student.Artificial Intelligence is poised to disrupt many industries, except the education industry.

The industry in this sector is especially important, as there is lot of potential in this domain. It is estimated this with increased internet penetration, the affordability and accessibility of E-learning will grow tremendously. According to a report by World Bank, the size of online education will continue to grow for years to come, and will reach $6 billion dollars by 2024.
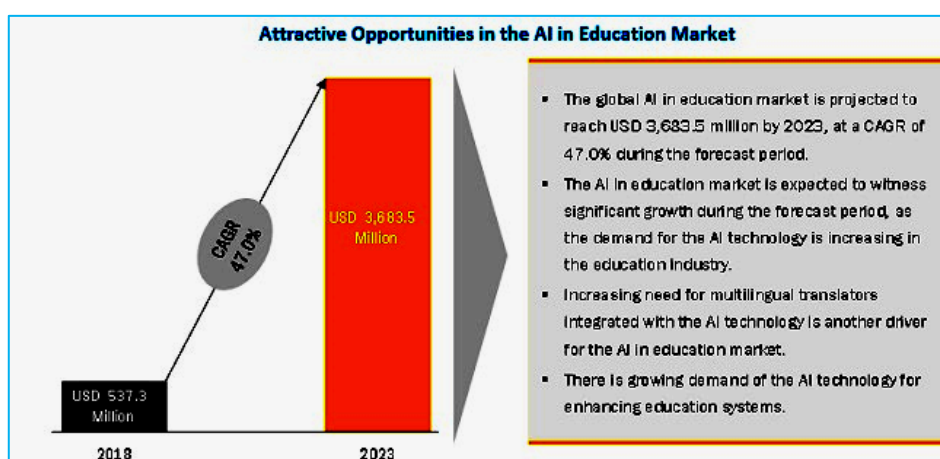
https://www.marketsandmarkets.com/Market-Reports/ai-in-education-market-200371366.html[102]

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[101]TRAI, CNNIC, Technopak Analysis

Thus, the race is on now among companies that can consistently produce quality content with economical pricing supported by artificial intelligence and machine learning. While there are many startups entering the fray, an established company, UnfoldU, has created a well-respected brand in India but is also now poised to bring its expertise to North America, the United Kingdom and Australia.

A vision of Mr. Harish Bajaj and his father Sh. Ram Bajaj, UnfoldU, is a creative and innovative educational platform. It meets the requirements of both parents and students for a successful educational journey. The inception of UnfoldU started with the idea of helping those students with good quality content. There is ample amount of free content available on the internet but what to study and what not to study is the question that the students face every time they open the several books for one chapter or open google for help. Time is money. Students these days face cutthroat competition to excel and perform in every subject. The first thought that parents get for helping their kids is to put their child in a good coaching center. But taking admission in coaching centers was putting a lot of pressure not just on the students but also on the parents.

Students are forced to juggle their time between school, coaching, self-study, and homework. Parents on the other hand are concerned about the safety of their child. Taking time to pick up and drop their child in the coaching center, risk of kids getting involved in bad peer groups, excessive financial pressure on the limited income of parents, etc.

Not all students are efficient enough to cope with the ever-increasing study pressure. Some students also find it difficult to ask questions in front of their peers. Stress of study has been the major cause of student suicide.

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[102]https://www.marketsandmarkets.com/Market-Reports/ai-in-education-market-200371366.html
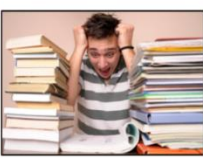
Pressure of performance, retention capacity, attention issues, etc. are some of the major causes of stress amongst the students.

"The popular perception is that failing exams or inability to cope with academics is the primary reason for student suicides," Saldanha told India Spend in an email interview. "This is rooted in a sense of helplessness or extreme frustration."

In such times, UnfoldU emerged as a perfect tuition replacement for school students.

UnfoldU was established in 2013 by Mr. Harish Bajaj as the chairman and Ms. Neeru Arora as the Project Manager and got promoted to the position of Director through her consistent hard work.

Ms. Arora has been responsible and the most important board member responsible for executing the vision of the chairman. The vision was to revolutionize education & learning and replace the tuition centers. Started off as a one-man army, Ms. Arora has played a key role in bringing together a team of more than 100 professionally qualified resources and training them for fulfilling the goals of the organization.

Under the able guidance, UnfoldU has emerged as a personalized learning system to provide the most advanced form of digital education to the students. Currently the product is being counted as one of the top 10 emerging e-learning sites in India.

From the very beginning Ms. Arora has been working to develop the curriculum for all state boards across the country. The target subject being math and science.

The list below shows all the state and national boards being covered by UnfoldU.

Boards & Curriculum Covered

Student can select syllabus according to their board from 31 Boards including CBSE, ICSE & NCERT Solutions.

List of State Boards

Andhra Pradesh, Andhra Pradesh Board of Secondary Education	**Arunachal Pradesh**, Arunachal Pradesh Board of Secondary Education
Assam, Assam Board of Secondary Education	**Bihar**, Bihar School Examination Board
CBSE, Central Board of Secondary Education	**Chhattisgarh**, Chhattisgarh Board of Secondary Education
Goa, Goa Board of Secondary and Higher Secondary Education	**Gujarat**, Gujarat Secondary Education Board
Haryana, Haryana Board of Secondary Education	**Himachal Pradesh**, HP Board of School Education
ICSE, Indian Council of Secondary Education	**Jammu & Kashmir**, Jammu & Kashmir State Board of School Education
Jharkhand, Jharkhand Secondary Examination Board	**Karnataka**, Karnataka Secondary Education Examination Board
Kerala, Kerala Higher Secondary Examination Board	**Madhya Pradesh**, MP Board of Secondary Education
Maharashtra, Maharashtra State Board of Sec. and Higher Sec. Education	**Manipur**, Manipur Board of Secondary Education
Meghalaya, Meghalaya Board of School Education	**Mizoram**, Mizoram Board of School Education
Nagaland, Nagaland Board of School Education	**NCERT**, National Council of Educational Research and Training
Odisha, Odisha Board of Secondary Education	**Punjab**, Punjab School Education Board
Rajasthan, Rajasthan Board of Secondary Education	**Sikkim**, Sikkim Board of Secondary Education
Tamil Nadu, Tamil Nadu Board of Secondary Education	**Telangana**, Telangana Board of Secondary Education
Tripura, Tripura Board of Secondary Education	**Uttar Pradesh**, Board of Sec. Education Kant Shahjahanpur Uttar Pradesh
Uttarakhand, Uttarakhand Board of School Education	**West Bengal**, West Bengal Council of Higher Secondary Education

Note: All above figures are rounded and used for illustration purposes only.

UNFOLD U

The growth of UnfoldU has been phenomenal over the years. With excellent product planning and marketing skills the student base has been increasing exponentially.

The company started its functioning in 2012 and is professionally managed by a board of qualified directors who command industry-rich knowledge and a deep expertise in different fields.

Under a planned process, it was decided by the management that the brand will only be launched into the market once the product is ready as per the market demands. Initially those subjects were targeted which were the pain points of students, that is math and science. Ms. Neeru Arora being a math mentor took charge and created the content herself. Gradually adding and training more resources to the team. Best faculties were hired for science subjects.

Visually appealing videos were created that explained theories with the help of real-life examples. The image given below shows screenshots from some of the animated and visually appealing videos created by UnfoldU.

Under the able guidance of the top management, UnfoldU is presently counted among the top 10 E-Learning Apps in India,

Through a detailed market survey and study, different interactive and interesting methods were developed for the students.

Product:

Understanding the solution better, the platform aims to provide quality educational service that recognizes the different needs of all students in a geographically dispersed environment. The material provided by our company includes KG to 12th classes, which includes a wide range of subjects like Mathematics, SST, Science, English, Humanities, Commerce, and test series for a range of competitive exams. Perfectly placed in this segment, the key features enabled by the end-to-end and futuristic platform are the step by step explanation provided through videos, solutions for the questions in the chapter, revision notes for exam time, test questions in the form of multiple choice questions, solved board papers from the past years included in the library of information provided, glossary, translation of mathematical symbols, discussion room and a host of features specifically designed into the portal in order to develop the students' interest in studies.

The course package includes:

a.   Engaging Explainer Videos,

b.   Conceptual Animated Videos,

c.   Detailed Homework Solutions,

d.   Revision Facilities and

e.   MCQs Practice.

f.   Feature of asking doubts from the faculties

g.   Digital notes

h.   Weekly MCQ test by the name "U-Live Test".

Over the period, UnfoldU has developed a massive library of:

● more than 5000 animated Conceptual Videos in both the languages — English and Hindi.

● more than 2.2 Lakhs Solved Questions, more than 65000 Quick Review Slides

● more than 30000 Sub-Topic Videos

● more than 33000 Objective Questions

- A Formula Book

- Covering all subjects from 1 to 12

The system has been engineered to ensure that parents receive a holistic report about:

- the duration studied by the student; number of questions solved by the student

- detailed report of which video has been watched and how many times.

Determined to contribute to the advancements in this segment, the company has started its project for Canada, and intend to penetrate the market of eight other countries across the globe: USA, Australia, England (UK), Europe, New Zealand, Singapore, South Africa, and the Middle East.

Our company, UnfoldU, was recently listed on OTC Pre Markets, and a huge interest for its shares was seen. Understandably so, the company has commanded a valuation of over US $2 billion valuation.

UnfoldU is now nearing one million users per year. The company began a successful business model by targeting middle class families which never had access to online education but wanted it to supplement education in physical, traditional avenues.

UnfoldU believes that education is the most essential part of the Indian culture and every child has the right to education and thus UnfoldU was established to make education accessible to all. The objective of UnfoldU was to make learning fun, to increase accessibility and affordability of education. The company has a strong foundation, as we have rigorously created study material covering all subjects of all classes. Company is also providing valuable material for various competitive exams. The ultimateobjective of our firm is that everyone should have accessibility to quality education. The company conducts its business by facilitating its clientele with free net based basic knowledge and provides advanced level education at nominal charges.

Business Model:

The system has been developed to not just assist students in achieving a great education at affordable costs, but parents can also earn from it as their child studies. By generating referral

incomes, the parents can even dream of making their child's higher education free of cost. Parents can earn by generating referrals and making sales.

E-learning is still poised with the challenge of establishing faith of parents on the effectiveness of interactive learning as most people are more inclined towards the conventional methods of learning. Hence, making them understand the benefits of E-learning has proved to be an impediment inflourishing education.

https://www.cioreviewindia.com/magazines/LMS-special-october-2018/[103]

With each passing day, E-learning market is becoming more and more competitive, here at Unfoldu we are focusing more on innovation and creativity. We aim to develop, such digital learning solutions, which can provide a deeper understanding to all brilliant young minds of today.

Students are using our platform to enhance their understanding with each user's experience being personalized through such emerging tech capabilities. If the AI of the application senses that a student has been learning at a faster pace, then the application automatically recalibrates itself and vice-versa.

Future Plans:

The company has developed, in-house technology which will analyze and evaluate the learning speed of students. The backend codes are written in a such a way that performance evaluation of students will be done in real time basis. This will provide greater insight into their exam preparation. Questions are created based on several internal parameters that are more deeply tied to additional variables around behavior and cognitive responses. The additional competitive advantage in this system is that AI also informs parents about the performance via computer generated voice calls and shares the feedback. Further, parentswill be able to communicate with the AI,and their responses and feedbacks will be incorporated into the system.

In near future, Unfoldu will be launching its IEO, this will put our company on an upward trajectory.

The tokens which are being provided by the company, could be used to buy courses on our platform. These tokens are currently being

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[103]https://www.cioreviewindia.com/magazines/LMS-special-october-2018/

traded on Bit Lux OTC exchange. The additional funds available with us, will be used to A whitepaper, which explains our short-term and long-term objectives, has already been published. Additional funds will be allocated to advance research capabilities in AR and VR. Such an initiative will increase knowledge retention capabilities of students.

https://www.forbes.com/sites/laurencoleman/2019/10/18/heres-whats-next-at-the-explosive-intersection--of-ai-and-on-line-education/?sh=4061f697276f[104]

Unfoldu Group Inc. has crossed over US $2 billion valuation. Unfoldu has forged partnerships with numerous schools, who are willing to provide digitized material to their students. The probability of succeeding in this endeavor depends upon the hard work which the team will put.

6. **Bibliography**

1.   National Sample Survey Office (NSSO) Report, July 2015
2.   KPMG in India's research and analysis 2017
3.   What does it cost to educate your child in India: Tomorrow makers, 25 November 2015
4.   Three Reasons Why Distance Learning is Taking Off in India, Technavio, 17 April 2015
5.   MHRD Higher Education at a Glance, 2015-16
6.   Literacy rate at 71% in rural India, 86% in urban: Survey, DNA, 30 June 2015
7.   India to see severe shortage of jobs in the next 35 years, Live Mint, 28 April 2016
8.   Highest unemployment rate in India in 5 years: Govt. Survey, Financial Express, 1 October 2016
9.   Drogue TE. Different teaching methods: a panacea for effective curriculum implementation in the Classroom. Int J Sec Educ. 2015; 3:77–87. [Google Scholar]
10. Busier JC, Drogue TE. The relevance of instructional materials for effective curriculum delivery in Nigeria. JTIPTE. 2011; 2:9. [Google Scholar]
11. Oda Yasutomo, Koizumi Shinzo. Status of medical education reform at Saga Medical School 5 years after introducing PBL. Kaohsiung J Med Sci. 2008;24(3):46-53. [PubMed] [Google Scholar]
12. Lin Yu-Chin, Huang Yu-Sheng, Lai Chung-Sheng, Yen Jeng-Hsien, Tsai Wen-Chan. Problem-based learning curriculum in medical education at Kaohsiung

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[104] https://www.forbes.com/sites/laurencoleman/2019/10/18/heres-whats-next-at-the-explosive-intersection--of-ai-and-on-line-education/?sh=4061f697276f

medical university. Kaohsiung J Med Sci. 2009;25(5):264-270. [PubMed] [Google Scholar]

13. Module 1: Developing 21st Century Skills. Developing 21st century skill, module 1. Accessed on February 10, 2019.

14. Awotua-Efebo EB. Effective teaching: principles and practice. Port-Harcourt: Paragraphics; 1999. [Google Scholar]

15. Internet in India - 2015