Is India ready to accept an EdTech-intensive system in post pandemic times? A strategic analysis of India’s “readiness” in terms of basic infrastructural support

Rohit Kumar Nag

Abstract The pandemic situation has forced most of the countries to plummet toward a virtual, distant learning format in recent years since 2020. While there are certain undeniable benefits of a virtual, technology-infused setup, it essentially calls for a complete paradigm shift for a country like India which has otherwise been a practitioner of traditional classroom teaching. Despite that, the recent boom in the EdTech market in India coupled with recent government policies indicate that India is going for that paradigm shift. The key thing to note here is that an EdTech-intensive setup is not as primitive as the traditional one. Its feasibility demands more rigorous infrastructural support. This paper looks into the very basic infrastructural requirements of the system in light of a very straightforward strategic analysis model—Objective and Key Results. Under this setup, India’s readiness is measured in terms of the availability of electricity, internet, and digital equipment with the intention of making an accessible, affordable and inclusive EdTech-driven education system. Moving one step further, this paper also tallies the recent policies with the specific shortcomings of the existing system to determine whether or not India is moving on the right path to progress. In a nutshell, it is found that there is ample room for improvement in the current arrangement for implementing a large-scale EdTech-enabled system, but the progress is most certainly happening in the right direction. Recent policies make quite an argument in favor of doing away with the digital divide and building an effective and inclusive EdTech-powered education system for the future generations of citizens.

Keywords Education · Educational technology · Information and communication technology · National education policy · Educational infrastructure

JEL Classification I20 · I21 · I24 · I28 · L86

Background

In March 2020, after WHO declared the COVID-19 to be a global pandemic, the majority of the countries imposed a “lockdown” to control the spread of this virus, putting an immediate halt to all sorts of economic and social activities. This frozen state of the economies directly impacted all sectors including the education sector as well. A compulsion to find an alternative mode of operation became the burning necessity. In this situation, most of the countries adopted remotely operated distant learning as their key technique to continue the functioning of their respective education sectors. This is where it is to be vehemently pointed out that this adoption was a compulsion and this has impacted the education sector...
and its stakeholders in various ways depending on several preparedness and acceptance parameters. In other words, a sudden paradigm shift is expected to impact different cohorts of stakeholders differently due to the difference in their ability to accept and manage the so-called “new normal”. Therefore, at the beginning of 2022, while the world moves toward a post-COVID-19 situation, it is increasingly important to discuss the impact of these modifications on the stakeholders. In recent days, the global education scenario has leaned toward technology-infused teaching and learning which includes components of distant learning and remote operations. Specifically, after the pandemic, the world has acknowledged not only the benefits but the sheer necessity of a virtual platform in the education sector. So, instead of a temporary solution to mobilize an otherwise frozen economy, technology-infused operation is being widely thought as the future face of the global education industry. This is where both the context and the intent of this particular paper come from. Switching to a more technology-infused system is not a minor modification, it is a gigantic leap to a completely different paradigm. Therefore, the prerequisites of this jump are expected to be different than the existing traditional classroom system which has been operating for centuries now. But in the modern setup, the method of teaching and learning is operated through Information and Communication Technology (ICT). Therefore, if ICT being the driving force of the education industry becomes the norm, the prerequisites are to be taken care of to ensure smooth and inclusive operation for optimum yield. In other words, the “readiness” factor is to be considered with utmost importance in order to make this transition a successful and productive one. This particular paper specifically focuses on the situation in India to assess its readiness in taking on an ICT-powered education system. Put differently, this paper scrolls through India’s recent moves to embrace ICT-powered education, the challenges that come with it, and policies to cater to those challenges.

**Evolution of educational technology in India**

In a world that is espousing ICT-powered education, India is certainly not falling behind. While it is true that India’s education sector is primarily reliant on traditional classroom teaching approach, recent developments in the Indian education sector show clear inclination toward Educational Technology (EdTech). EdTech offers a certain range of major benefits over the traditional setup. Firstly, EdTech allows customization and personalization of the curricula based on individual specific requirements and abilities. Secondly, the involvement of ICT provides ease of access to educational content for both learners and instructors. Lastly, EdTech enables distant learning and remote operations, as discussed previously, removing geographical constraints of learning (Zhang and Aslan 2021). In short, it can be said that EdTech provides a structural easement and thus accelerates the very process of delivering education. This in turn translates into economic growth through increased labor productivity, technological innovation, and implementation of newer technology (Hanushek and Woessmann 2010). This is where the social and economic interest begins to grow for any country to implement EdTech.

India is home to the largest population of learners belonging to the K-12 system with a reported enrollment rate (2017–2018) of approximately 250 million learners in 1.5 million schools across the nation (Statista survey data). Therefore, augmenting the education system to reap the benefits of EdTech and ICT-driven learning will surely contribute to the overall human capital formation and subsequent increment in productivity along with technological innovations in India translating into higher economic growth. Incentivized by this motive, the Indian education sector has become the cultivation ground of budding EdTech ventures in recent years. Both private sector and public sector initiatives have been seen to be growing in order to make EdTech more mainstream and an integrated part of the Indian education system.

The stepping stone of the Indian EdTech ecosystem is the launch of the EDUSAT satellite. In September 2004, a project of INR 5.5 billion was conducted by the Indian Space Research Organization (ISRO) in order to launch this satellite which was designed to cater exclusively to the educational requirements of the country. In specific, the satellite was used to create virtual classrooms in remote areas of India to deliver education through visualization offered by video programs telecast by the satellite (Nagaratinam 2015). In 2008, private players came into the field and e-learning platforms like Extramarks and Khan...
Academy became popular in India. With this, gradually EdTech started providing successful business models to startups in the Indian market with a vast user base. This gradual increment came to its peak and turned into an EdTech boom in 2015–2016. According to the reports published in The Economic Times and estimations done by Nasscom, in 2015 alone, nearly a thousand EdTech startups came forward to join the EdTech venture in India with an estimated funding of USD 125 million. At the same time, Indian students started joining other internationally recognized platforms as well. According to a MyStory report, in 2015, more than 1.5 million learners joined online courses on the popular US-based platform Coursera.

This rapid growth has only seen an upward trajectory in terms of consumption over time. Parallel to the great potential of the Indian market, the Indian education industry has become the breeding ground of many blooming and booming EdTech startups. Currently, there are approximately 4530 EdTech startups in India of which more than 400 were founded after 2019. Very recently, Indian EdTech startups have attracted nearly $4 billion worth of investments in the past two years, of which $2.2 billion was invested in 2020 alone right after the nationwide lockdown had frozen the education sector of the country. An additional $1.9 billion investment done in 2021 has added 3 more Indian names to the list of global EdTech unicorns (valued at over $1 billion). The Indian name Byju’s, existing in the world EdTech unicorns list since 2017, has now become a decacorn with a valuation of $21 billion (HolonIQ 2022). Unacademy, Emeritus, and upGrad are three more Indian EdTech startups that have been included in the list in August 2021, followed by Vedantu in September of that year. Very recently, another Indian startup, Lead School made it to the list in January 2022 (HolonIQ 2022). It is to be noted here that Byju’s is currently the world’s largest EdTech startup catering to more than 100 million registered users. These figures make it evident that India is a very lucrative market for EdTech. The National Education Policy (NEP) 2020 is the government’s newest arrow in the quiver to achieve Sustainable Development Goal (SDG) 4 (to provide quality education to its citizens) which inherits the very concept of EdTech in the day to day educational operations. As already discussed, EdTech has three main components through which it enhances the educational outcomes: customizability of content, accessibility of content, and remote operations. NEP caters to all three of these components. In order to identify and acknowledge student-specific characteristics and infuse them in the learning process, NEP proposes detailed renovation and reintroduction of the e-learning platforms, e.g., SWAYAM and DIKSHA; this will make the system more “student-centered”.

Providing e-content and QR code energized textbooks across the entire country through these platforms will give ease of access to educational content. Additionally, keeping in mind the paucity of digital resources, NEP also proposes to use standardized multimedia platforms i.e. radio and television to deliver educational content to the general populace. Apart from this, the top one hundred universities across the country are permitted to start online courses from 30 May 2020 itself which allows students to access courses according to their requirement and preferences without worrying about geographical barriers and the hustles of relocating.

Considering the overall scenario, it is safe to say that EdTech in India is not just an alternative for an otherwise frozen system. The gigantic growth and immaculate presence of EdTech in the veins of the current educational practice in India put forth a clear signal that EdTech is ready to become an integral part of the next generation Indian education system. This brings forth the motivation to discuss different preparedness parameters in the Indian socioeconomic framework to ensure a fruitful and inclusive operation of EdTech in the country.

Motivation

In the economics of education literature, it is well established that EdTech appreciably widens the horizon of possibilities in the education sector. Most importantly, it accepts the heterogeneity among students to provide a more engaging and well-suited
experience of learning (Al Hadwer et al. 2019) which was otherwise missing in the traditional “one-size-fits-all” system. Simultaneously, it is also undeniable that the infrastructural requirement of a majorly EdTech-driven system is not as primitive as the traditional classroom teaching setup. The most critical divisive factor between the two is the requirement for digital infrastructure as EdTech systems highly rely on ICT. This raises the concern to study the “readiness” factor of any country prior to implementing a large-scale EdTech transfiguration (Adam et al. 2021).

It is very important to note here that the readiness factor primarily consists of infrastructural preparedness and access to digital resources which in turn depend on the socioeconomic condition and governance of a particular country. These factors are very country-specific and contain irregularity. Conclusions drawn on the basis of parameters observed in one country, cannot be relevant in the case of another. Therefore, because of the irregularity of the domain, the literature is unable to come to a generalized opinion about the readiness (or feasibility in other words) of a full-scale adoption of an EdTech driven system. This question has to be answered on a country level. Specifically, in a developing country like India, the question of readiness is of utmost importance, because within-the-country variations are also to be considered in a large country like India with such a vast population. These within-the-country variations can put barriers among the population and hinder the inclusivity of the venture in totality. This paper attempts to strategically analyze the situation and assess the very basic readiness factors in the way of embracing an EdTech-intensive system in India.

Research question and methodology

With the compulsive switch to the virtual platform along with the push of NEP 2020, a permanent paradigm shift in the Indian education sector is imminent. This paper attempts to assess whether or not India is ready for that shift. The main problem with such a discussion is the subjectivity of the term “readiness” itself. Therefore, it is of utmost importance to have a precise definition of the term “readiness” in order to clearly establish the territory of the upcoming discussion as well as map the procedure of analysis step by step.

With that purpose in hand, one of the most straightforward strategic planning models, Objective and Key Results (OKR) is considered here (Grove 2015). OKR is all about setting a specific achievement, also known as the “objective”, and deploying a few measurable quantitative parameters of progress, also known as “key results”, which are then tracked to know how close or how far one is from their respective objective. This particular framework can be adopted quite suitably here. The first step is to identify the objective at hand. Obviously, the objective is to make India ready for an EdTech-intensive education system in post-pandemic times.

The next step is to find out the measurable quantitative parameters (i.e. the key results) to reflect the progress toward the said objective. In order to set up the key results, an approach known as the Key Performance Indicators (KPI) is used. It essentially states that there are a few crucial (measurable) performance parameters that are responsible for the overall effectiveness of the system. Here, studying the literature, one can easily say the first and foremost parameter which is responsible for making an EdTech driven system successful is the availability of the internet along with digital devices. ICT being the building block of EdTech, without internet and digital devices it is simply not possible for any EdTech system to function. The necessity for these is well documented in the literature. However, if one moves one step further, there is a more rudimentary factor to be considered—electricity! Without electricity, it is once again impossible to power up the equipment.

Therefore, electricity, internet, and availability of digital devices can be considered three primary factors which affect the performance of the EdTech system. These are quantifiable parameters as well. Simply by considering the penetration rate, a picture of progress toward the desired “readiness” can be painted. Hence, the research question boils down to the following,

Is India ready to accept an EdTech-intensive system in post-pandemic times, where readiness is measured in terms of

a. availability of electricity
b. availability of internet connectivity
c. availability of digital resources.

In other words, the fields of electricity, internet connectivity, and digital resource availability will be reviewed in detail to figure out how far or how close
India is to attaining the desired readiness to have an effective EdTech transfiguration of the education system in the country. In this context, within-the-country variations are also pointed out to render the picture of inclusivity in the system. Additionally, this paper will also take a quick glance at the recent government policies to see if the policies are at par with the measures necessary to address any shortcomings of the current arrangement.

**Implication of the key performance indicators**

While the data clearly reflects a flourishing business for the EdTech hubs in India, it is important to ensure its inclusivity while discussing a nationwide application. In fact, the transition to a new paradigm affects different cohorts in different ways in conformity with their distinctive values of readiness. Therefore, it is important to include all the stakeholders across all geographic, cultural, and socioeconomic backgrounds while deciding on the future footsteps of the Indian education system. Notwithstanding the individual preferences and capabilities and their respective effects, infrastructural constraints are to be widely discussed in this regard as well in the context of a developing country like India. This is where the aforementioned “key results” are going to come into play. To understand this wide-ranging diversity across the country, and how that affects the readiness under consideration, the situation is reviewed on the basis of those predetermined parameters: electricity, internet, and access to digital resources.

**Key performance indicators**

**Availability of electricity**

In reference to infrastructural preparedness, the most primary technical requirement of an ICT-driven system has to be electricity. According to the World Bank Global Electrification Database, in 2019, more than 97% of Indian households have electricity added to the list of their available basic amenities. This is undoubtedly a remarkable leap forward from 88% in 2015 and 89.5% in 2016. However, the vast land of India is not so uniform to be treated as a single entity. A very basic division would tell that among the 1.2 billion population, more than 833 million reside in rural areas whereas only 377 million are urban residents (Indian Census 2011). While the situations in rural and urban India are not quite similar, on average the disparity is not that pronounced. In fact, since 2015, the electrification process in rural India has been quite successful according to the data given by the Council of Energy, Environment, and Water (CEEW) (Agrawal et al. 2020). The average daily supply of electricity to an urban household is 22 h compared to their rural counterparts, lagging behind only by a minuscule 2 h with an average daily supply of 20 h. However, a further division with respect to states can take one deeper into the scenario. On the one hand, despite the very successful rural electrification project, 2.4 percent of households (mostly rural) still have no electricity in their houses due to the affordability factor. This 2.4 percent of households majorly belong to the states of Uttar Pradesh, Madhya Pradesh, Rajasthan, and Bihar. Three of these states, Uttar Pradesh, Madhya Pradesh, and Bihar have been part of the ACCESS program (The Access to Clean Cooking Energy and Electricity—Survey of States) and have shown steep increment in electrification in the rural areas along with Jharkhand, Odisha, and West Bengal. Despite that, there are still people in these states who can not afford electricity. Compared to only 12.5 h daily in 2015, the average electricity availability has significantly increased to 18.5 h daily in 2020. In 2020, 73 percent of rural consumers have reported to be satisfied with the facilities related to the availability of electricity in their households which is a significant increase from only 23 percent in 2015 and 55 percent in 2018. Therefore, despite some hindrance, the overall situation in terms of availability of electricity in rural India has significantly improved after 2015. However, specific states, e.g., Uttar Pradesh, Haryana, Jharkhand, and Bihar are still behind (Indian Residential Energy Survey 2020) with less than 18 h of supply in rural areas and about 20 h in urban areas which lie quite below the average line for India as a whole. In sum, it indicates that while there is some lack of consistency across all states and demographic variations of the country, the holistic picture of the entire country shows a significant improvement over the past few years. But there is definitely room for improvement. For instance, two-third of rural households and two-fifth of urban households still face abrupt power disconnection at least once a day as
reported by CEEW. In a nutshell, a significant trend of improvement is evident with some space for refinement in the way of building a sustainable system.

Availability of internet

In the queue, the next is access to the internet. After the introduction of the “Digital India” programme in 2015, several steps were taken in the way of revolutionizing the telecom industry in India and it has significantly increased access to the internet through mobile networks. One of the major contributions came from Jio telecom services introduced by the Reliance group in 2016. In 2021, the world’s second-largest online market (behind China) India had over 560 million internet users with a projected number of 650 million in 2023 (Statista, August 2021). It is true that this constitutes only around half of the existing population in the country. In other words, the internet penetration is only 47% in India (Keelery 2021). However, here as well, it is to be noted that this number was only 27% in 2015 (and about 4% in 2007), therefore, it can be thought of as quite a leap forward in the past few years. However, it is important to mention here that while the disparity among the number of internet users in rural and urban India is relatively low, there is a significant gender bias when it comes to the rural population where 58% of the users are male and the rest 42% are female (Statista 2021). Similar to electricity, a disparity is observed from state to state. While the average penetration rate in India is 40 percent, it is 68 percent in Delhi followed by Kerala at 56%. Odisha, Andhra Pradesh, Telangana, Madhya Pradesh, and West Bengal belong to the bottom of the list with a slightly above 30 percent penetration rate (Statista, March 2022).

Availability of digital equipment

Availability of digital equipment has been seen to be the epicenter of the quibble in many cases during the COVID-19 lockdown in the country. In fact, many students have reportedly committed suicide after being deprived of the privilege to join online lectures due to the lack of a smartphone or similar device. Including the incidents that happened in Mysuru, Karnataka (August 2020); Satara, Maharashtra (September 2020), and Punjab (June 2020), scarcity of digital resources has surely been a major contributing factor in the loss of nearly 12,500 lives of students in 2020 alone as reported by Times of India in November 2021 (Kumar 2021). The data shows that the number of smartphone users in India is nearly 748 million in 2020 (Statista, September 2021) which is around 57% of the entire population. More importantly, it is to be noted here, that usually, young students do not own their own devices. For instance, a student studying in kindergarten is not expected to have his or her own device. Moreover, as per world bank reports, the per capita income of an Indian individual is USD 1927 which if calculated, turns out to be USD 160 per month. The average price of a smartphone is recorded to be USD 196 in 2020–2021 (Statista, December 2021). Therefore, affordability becomes an issue in this case, specifically for low-income groups. This establishes the fact that in terms of access to digital equipment, there is a serious disparity among people belonging to different socioeconomic backgrounds when it comes to the availability of digital resources. This is one of the major problems dreading the EdTech-driven system. Inclusivity is expected to be hindered in this case.

Recent policies: direction and effects

In a survey conducted by KPMG and Google in 2017, it was vociferously advocated that in order to spread EdTech in the country, it is very important for the citizens to have access to cheap internet and digital equipment (Pandit and Agrawal 2021), as well as have the necessary government support in framing “digital-friendly” policies. Therefore, this discussion cannot end without taking a glance at the policies at hand to promote EdTech in the country.

The above discussion carries a subtle essence that disparity in availability and affordability can create a “digital divide” in the country which hampers the fundamental motto of education as a part of SDG—inclusivity (Bonini 2020)! Therefore, on the one hand, government policies are to be focused on systematic modifications to the structure in terms of making suitable curricula and so on; on the other hand, ensuring equity to every learner irrespective of their demographic position is also of utmost importance.

As mentioned earlier, NEP 2020 is the current milestone of Indian policies with a target to give the Indian education system a detailed overhaul. Keeping
NEP at its heart, the National Digital Education Architecture (NDEAR) is deployed to translate the vision of NEP into reality. In NDEAR, a number of issues that plague the Indian education system have been raised and answered. The core essence of NDEAR is to build a decentralized, accessible, enriched, and inclusive system to deliver education to the learners. The foundational idea is to strengthen the ground for all stakeholders in the system including students, teachers, and school administration as well. The NDEAR articulates its objectives to include 170 million learners in the country belonging to the age group of 3–23 in the pool of school-going individuals and parallelly, address the issue of school dropouts. As discussed in the very beginning, NEP is designed to improve the accessibility of educational content. Although the discussion in the previous sections has raised a concern of affordability becoming an obstacle to accessibility, NDEAR offers ample access to both learners and instructors. While giving access to study material such as books, video lessons, virtual laboratories, etc. is a beneficial initiative for students under NDEAR, it also caters to the needs of the instructors by helping them to design better lesson plans, online referral content, and evaluation tools. A moment’s digression is to be done here to understand the importance of catering to both the demand (student) and the supply (instructor) side of the system. The recent literature carries significant evidence that instructors habituated to the traditional system often struggle to make the content engaging yet flexible to cater to different sorts of learners’ requirements and abilities. Another factor that contributes to this hurdle is the low feedback of virtual platforms. Since the interaction is not one-to-one, often it is difficult for the instructors to understand whether the content is suitable enough for the class (Bwire et al. 2020). This is why giving adequate support to the instructors is definitely an indispensable part of any digital teaching–learning system.

Strengthening the overall administration is also a part of NDEAR’s motto. The most interesting proposition made in NDEAR is introducing a “coherent multi-channel multimodal learning continuum”, i.e., to help the stakeholders to interact with each other on various platforms including television, radio, etc. as well as web portal, mobile application, and interactive voice response (IVR) with the motto of “anyone can learn” and “anyone can help learn”.

The initiative of DIKSHA (and other e-learning apps) that has been mentioned earlier, NDEAR also features a unified application program interface (API) for personalized adaptive learning experience for students as well as teacher training, school management, and other content enhancing and managerial purposes.

Now, this policy discussion has to be connected to the primary intent of this paper. The most significant grievances which came up by reviewing the “key results” under reference here are in terms of accessibility and affordability. The discussion about NEP and NDEAR that took place in this paper so far, shows a glimmer of hope that the policies have the potential to make education accessible for everyone. The usage of generic multimedia platforms like radio, television, and IVR which can go beyond the internet availability constraint and deliver educational content to everyone addresses one of the concerns raised here. The rest of the propositions, the e-learning platform, and its features are still expected to be delivered through the internet. Therefore, the internet connectivity issue is still a relevant constraint in the way of implementing an EdTech fueled system nationwide. However, in terms of affordability and availability of digital equipment, very recently, the Uttar Pradesh government has announced to give away 10 million smartphones and tablets to students for free. The first phase of this scheme has been rolled out on 25 December 2021. Similar initiatives have been seen in other states as well which include Haryana, Delhi, Karnataka, West Bengal, and Jharkhand (The Telegraph, November 2021). A similar scheme has been seen in Gujarat in the name of Namo Tablet Yojana 2022 where students will be given tablets at a subsidized price of INR 1000. Therefore, measures are taken to address the lack of digital equipment among students while keeping an eye on the affordability constraint. Hence, the major problems discussed before, as the hurdles toward adopting a more EdTech-intensive system, are being gradually addressed by the recent government policies.

Limitations of this approach

It is evident that India has come a long way to stand where it stands today. While there is still wide space for improvement, the major issues are well addressed by policies in recent times and this can be thought of as
a big step forward in making the digital dream come true. It will not be unjust on the basis of the existing discussion in this paper that a worthwhile implementation of the newly designated policy framework can make India stand shoulder to shoulder with the first world EdTech giants like China and USA. However, the strategic framework used in this paper to organize the arguments tends to assume a linear relationship between availability and functionality. In other words, it assumes that if digital equipment is available, it serves the purpose. This is not always the case. There remain two major questions of compatibility and digital literacy along with other minor concerns. Even if a piece of equipment is physically present, it might not be in a suitable condition to be operated in a way one wants to. On the other hand, a particular person, be that a learner or an instructor, might not have sound knowledge about how to operate the equipment. These additional concerns are discussed in the following paragraph with reference to an empirical exercise conducted in 2020.

Since the lockdown happened in the country, and in order to unfreeze the frozen education scenario everyone jumped into the puddle of familiarizing themselves with a virtual setup, a number of things have come forward. While the numbers look very promising in terms of infrastructural penetration, a survey conducted in 2020 that asked the stakeholders about the quality of service they are getting, specified that 80% of the sample population believed that the quality of service can be a limitation for expansion of online education, 70% of the sample population reported that they have faced difficulty in downloading videos from the internet for online education purposes (Wadhwa and Khatak 2020). The same study has also pointed out that 62% of the respondents were skeptical with security concerns regarding these online platforms e.g. Google Meet, Zoom, etc. The mishap of Gnosticplyers where 932 million user records were stolen from 44 companies in China (Tong, Zheng, and Wan 2019, December) reminds us that there is always a potential data security threat when it comes to such systems. It is also to be noted that most pre-school learners do not possess a smartphone or a tablet. Giving away devices by a particular state government is undoubtedly a noble initiative. However, if the actual numbers are considered, catering to approximately 250 million learners in the K-12 system alone, is an expensive and highly time-consuming task for the government. As just mentioned, digital literacy has to be taken into account in this regard. Acquiring a digital device alone is not sufficient, it is also important that the individual using it has at least a basic knowledge of how to operate it. Therefore, the availability of resources alone is, once again, not the only challenge being talked about here.

Concluding discussion

The primary question that has been explored in this paper is the readiness of India as an economy to plunge into a more ICT-driven, EdTech-intensive system post the COVID-19 pandemic. This readiness is measured in terms of the availability of (a) electricity, (b) internet, and (c) digital equipment. Obviously, an EdTech-driven system empowers the learners and opens up a new horizon of possibilities in front of them, but on the other hand, unlike the traditional setup, the infrastructural requirement of such a system is not so primitive. It is evident that India has significantly progressed in past few years in terms of infrastructural preparedness. The basic amenities of electricity and internet have a higher rate of availability among the citizens both in rural and urban areas. However, inter-state variation is at large in terms of electrification and internet penetration. For instance, Kerala has one of the best internet penetration and electrification rate in the entire country with 56% population having access to the internet and more than 23 h of daily average availability of electricity in both rural and urban areas. In contrast to that, Uttar Pradesh performs poorly in both cases with only 34 percent of the population having access to the internet and the rural electrification rate being the worst at a daily average of only 16 h. This disparity has to be addressed if digital divide is to be avoided. Although the government makes some promising cases in overlooking this digital divide and delivering educational content via more generic and more easily available multimedia platforms, e.g., television and radio and IVR phone calls and so on; to reap the benefit at its fullest potential, the availability of internet and electricity is to be improved. Programs like online textbooks through QR codes, e-learning platforms, and distant learning will not be effective if the accessibility of the internet is not ensured across the country. The availability of digital equipment has so far been the
most crucial of all three points because of the affordability factor attached to it. Specifically for low-income groups, buying digital equipment like smartphones or tablets is beyond the range of affordability. This problem has also been handled quite well by the recent policies where students were given tablets and smartphones for free or at a very low, subsidized price. Altogether, it can be said that despite the enormous room for improvement in terms of infrastructural availability, the rapid growth of the components under reference, and rightly directed government policies to supplement that growth make a promising case in favor of EdTech. India might not be completely ready yet, but it is certainly on the right track to be ready to accept a more EdTech-intensive system in post-pandemic times.

**Funding**  The author has not received any funding from any sources for this paper.

**Declarations**

**Conflict of interest**  It is hereby declared that there are no potential conflicts of interest regarding the research, authorship, and/or publication of this particular piece of work.

**Human and animal rights**  No human (and/or animal) participants were involved in the research and therefore, the issues of regulations involving human (and/or animal) participants and informed consent are rendered inapplicable in the case of this paper.

**References**

Adam T, El-Serafy Y, Podea M, Haßler B (2021) The use of “building blocks” to develop digital platforms for education in sub-Saharan Africa. EdTech Hub

Agrawal S, Ganesan K, Mani S, Jain A (2020) State of electricity access in India: insights from the India residential energy consumption survey (IRES) 2020. Council on Energy, Environment and Water. https://www.cceew.in/publications/state-electricity-access-india#:~:text=96.7%20per%20cent%20of%20Indian,Indian%20households%20still%20remain%20unelectrified

Bonini P (2020) When tomorrow comes: technology and the future of sustainability learning in higher education. Environ Sci Policy Sustain Dev 62(4):39–48. https://doi.org/10.1080/00139157.2020.1764300

Bwire F, Bagarukayo E, Muyinda PB (2020) Online learning challenges in academia: the case of Uganda. In: CSEDU (2), pp 484–489

Grove AS (2015) High output management. Vintage

Hanushek EA, Woessmann L (2010) Education and economic growth. Econ Educ 60:67

HolonIQ (2022) Global EdTech unicorns: the complete list of global EdTech unicorns. HolonIQ. https://www.holoniq.com/edtech-unicorns/

Keelery S (2021) Internet usage in India—statistics & facts. Statista. https://www.statista.com/topics/2157/internet-usage-in-india/#dossierKeyfigures

Kumar C (2021) 34 Indian students died by suicide each day in pandemic-hit 2020. The Times of India. https://timesofindia.indiatimes.com/city/bengaluru/34-indian-students-died-by-suicide-each-day-in-pandemic-hit-2020/articleshow/87638828.cms

Nagaratinam D (2015) Satellite based education for distance education through EDUSAT. Language India 15(10):149–166

Pandit D, Agrawal S (2021) Exploring challenges of online education in COVID times. FIIB Bus Rev. https://doi.org/10.1177/2319714520986254

Wadhwa N, Khatak S (2020) Online versus offline mode of education—is India ready to meet the challenges of online education in lockdown? J Soc Sci 48(3):404–413

**Publisher’s Note**  Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.