Grant Thornton

PHD CHAMBER
OF COMMERCE AND INDUSTRY

Technology and cyber trends in the Indian education sector

September 2022

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Foreword: PHD Chamber of Commerce and Industry

The new National Education Policy, 2020 (NEP) has been put forward with an aim to characterise changes in the system from the K-12 level to the college/university level. Keeping in mind the developing scenario, education content hereafter will focus on key concepts, ideas, applications and analytical angles.

The NEP is expected to deliver a positive and long-lasting impact on the higher education arrangement of the country. The fact that foreign universities will be allowed to open campuses in India is a laudable move by the government. This will benefit the students in experiencing the global trait of education in their very own country. The policy of introducing multi-disciplinary institutes will advance to a renewed focus on every field like arts, and humanities and this system of education will help students to learn and grow comprehensively. Thus, students will be equipped with an improved knowledge base.

Over the last decade, India has reformed itself into an information-intensive society and there is an expanding need to integrate the usage of technology in the field of education. In this regard, the Policy summarises that one of the paramount principles guiding the education system will be the large-scale use of technology in teaching and learning, removing language barriers, and growing access in addition to education planning and management.

The PHD Chamber of Commerce and Industry (PHDCCI) has a legacy of 117 years representing 150,000 industries and businesses from across the nation and has created a niche for itself through the excellent work done by expert committees, state chapters, international affairs committees and foundations on various subjects of importance.

This knowledge report by PHDCCI and Grant Thornton Bharat provides an exhaustive and illustrative view of the education ecology in India. On behalf of the PHDCCI, I would like to extend my warm greetings to all participants in the PHDCCI Education Summit 2022 and wish it a great success!

Pradeep Multani
President
PHD Chamber of Commerce and Industry

Foreword: Grant Thornton Bharat

The global digital boom has transformed the way we interact for everyday transactions, especially in India. Businesses, government, non-government entities, healthcare and the education sector have all been impacted in one or many ways with digital solutions substituting legacy processes.

Digitalisation has also upped the requirement of a large volume of electronic components from servers to network infrastructure viz. routers, switches; this also includes personal workstations, handheld devices, mobile phones, which are connected to enterprise systems over the internet.

The age of mobile applications is now here – all purpose, curated, user-friendly and modular – making the entire user process simpler for patrons across backgrounds. With the availability of cheaper, faster internet and a host of low-cost mobile devices in the market, digital dispersion to the masses has been phenomenal.

This report focuses on how the education sector has been impacted by the latest trends in technology, the effect of the pandemic on the medium of instruction, changes in engagement modes between pupils and instructors, cyber risks that have risen with the adoption of digital means and, finally, how cyber threats can be mitigated with good practices and precautions with the right safeguards for an environment of security, privacy and safety to prevail.

Akshay Garkel
Partner and Cyber Leader
Grant Thornton Bharat

Executive summary

The rise of technology and digital has impacted our lives, especially during the pandemic period. While technology and digital in the education sector has been prevalent, the real acceleration and impact was seen during the pandemic, when learning moved online and digital was the way for all forms of learning.

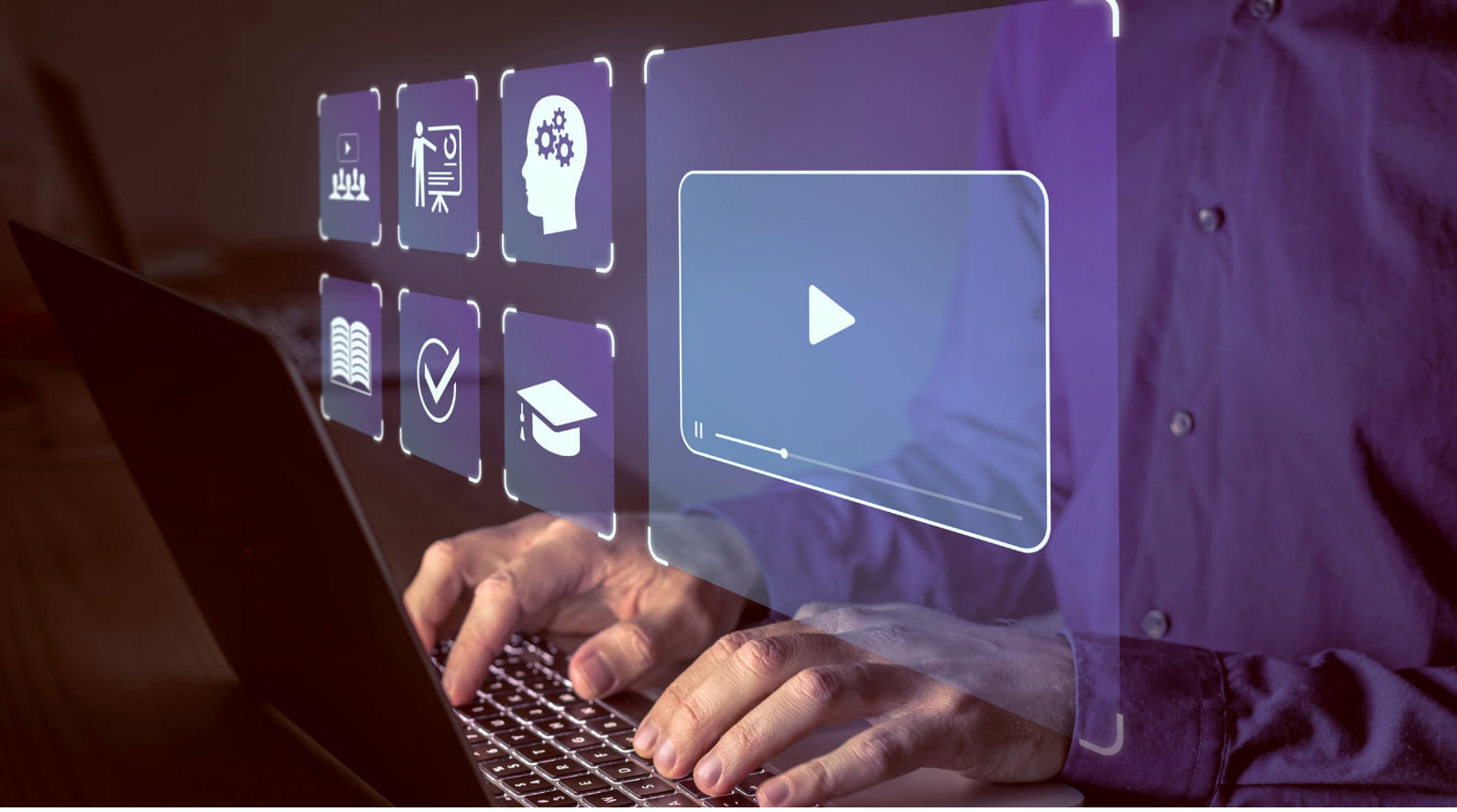
As Prime Minster Narendra Modi clearly articulates, "Technology for us is a medium to empower the people of the country. For us, technology is the mainstay of making the country Atmanirbhar."

The entire education ecosystem swiftly pivoted to online learning and disrupted the sector to bring lasting change. As we are coming out of the pandemic and education slowly moves to offline mode, the digital and online learning mode continues to thrive and we believe that hybrid model of education and learning is here to stay, evolve and thrive in the coming years.

With the rise in the number of mobile devices and increasing internet accessibility, India has robustly leveraged technology in the education sector. With the advent of 5G and ever-improving internet penetration and connectivity, India is well poised to harness the power of technology in the education sector, especially in non-metros.

The rise of technology in this sector has also led to the rise of cybersecurity risks and incidents that have impacted the sector. The cost of these cyber-attacks can be significant, both in monetary terms and the reputation loss for the educational institution, as well as the psychological impact on students.

We believe that technology, especially new technologies such as artificial intelligence (AI), quantum computing, metaverse, machine learning, blockchain and data analytics will continue to empower, change and disrupt the education ecosystem. India is well posed to leverage the power of technology to achieve its goals of education as covered by NEP 2020.



Approach to this report

Technological and cyber trends in the Indian education sector touches upon various nuances of education with the advent of technology in India. This report has been developed for the Education Summit taking place in New Delhi on 2 September 2022.

The growing education sector of the country has been witnessing a high demand in digitisation of education, which has led to numerous policy developments and increased investments in technology. The report also identifies the growing trends in the education technology (EdTech) industry, including the impact of COVID-19. Post the pandemic, there has been an increasing demand for online education, which has led to a surge in the number of EdTech start-ups in the country. From tracking drivers of the technological trends in this sector, the report attempts to understand the most pertinent issues plaguing the sector, which are areas around cybersecurity.

Along with analysing cyberattacks in the education cyber space, the report also recommends adoption of safe practices with campaigns around education and awareness to build a safer, secure cyber ecosystem for everyone.

Technology trends

Technology has been the answer to every new need in the society and the education sector has been heavily influenced by it. Technology has long been at the forefront of education, beginning from the Gurukul system of teaching to the entry of AI and virtual reality (VR). However, technology has completely revolutionised the modern education system, with digitally empowered classrooms. Even when the world was gripped by the pandemic, the education sector was able to overcome multiple challenges and showcased grit by transforming physical classes to online ones that could reach anyone, anywhere.

Trends in the education sector

Conventional schools and colleges have been playing catch up to new-age EdTech platforms that have surged ahead in the technological space. The set up needed to build an interactive platform for education requires a huge amount of funding and tech expertise which EdTech companies have been able to tap into given their deep pockets.

Focused efforts towards creation of a parallel platform for online tutoring have reaped benefits for them with the younger generation largerly preferring the anywhere, anytime option, coupled with flexibility and ease in sharing, storage, and access in electronic modes over devices of their choice.

Technology has also played a key role in making instructing interactive with the use of graphics, interactive dashboards, immersive experiences with VR/augmented reality (AR) features embedded in the curriculum to generate deeper interest and involvement of students.

A few technological trends that have shaped the sector in the recent past are:

a. Virtual satellites (V-SATs): The V-SAT models were probably the first tech-adoptions in the education sector with the possibility to address a large crowd, not limited by physical space, so students could be spread across a wide geography. The whole set up required a studio for teachers to instruct, antennas over classrooms for reception, servers for data and a hub earth station. All of this required elaborate infrastructure and high maintenance. The trend faded soon.

b. Virtual classrooms: Cloud-based enterprise resource planning (ERP) platforms have proliferated the ecosystem. They offer a variety of learning modules, class recordings, self-assessment quizzes and guided reading of e-notes with live instruction through video conferencing applications. These apps have features aplenty, ranging from screen sharing, instant chat, file sharing to breakout rooms, attendance log, etc. They are built for personal computers, tablets and even mobile phones, where maximum engagement is seen.

c. Interactive dashboards on ERP modules help administration, tutors and students get quick insights of study sessions, record of quizzes, submission of assignments, gateway to knowledge portals, etc.

   The major benefit of ERP-based classrooms is the easy integration across devices running on disparate operating systems, thus, making it seamless for the user to access and operate without investing in needless infrastructure.

d. Cloud service providers offer a host of services on a subscription basis customised to the requirements of the users. This has solved various problems associated with expensive IT infrastructure, availability, maintenance, upgradation, etc.

   Offerings over VR and AR have been the latest entrants to the EdTech sector.

   Students get the feel of being in a virtual environment by using VR headsets and other wearables. Any possible environment can be recreated to make the students feel they are living in the time and place of what is being taught.

e. AR modules use the smart device's camera and sensors to process data around the user's environment to place the object of study which then appears on the screen of the user. This has pushed the boundaries of immersive learning to a whole new level.

Engagement over a technological medium

Technology has forced both instructors and students to change the way they interact in a classroom setting. The traditional classrooms had a rigour of physical attendance and learning along with fellow students that helped to develop interpersonal skills and cultivate good social behaviour. Instructors could interact face-to-face with students, mentor them and be a guide to their overall development.

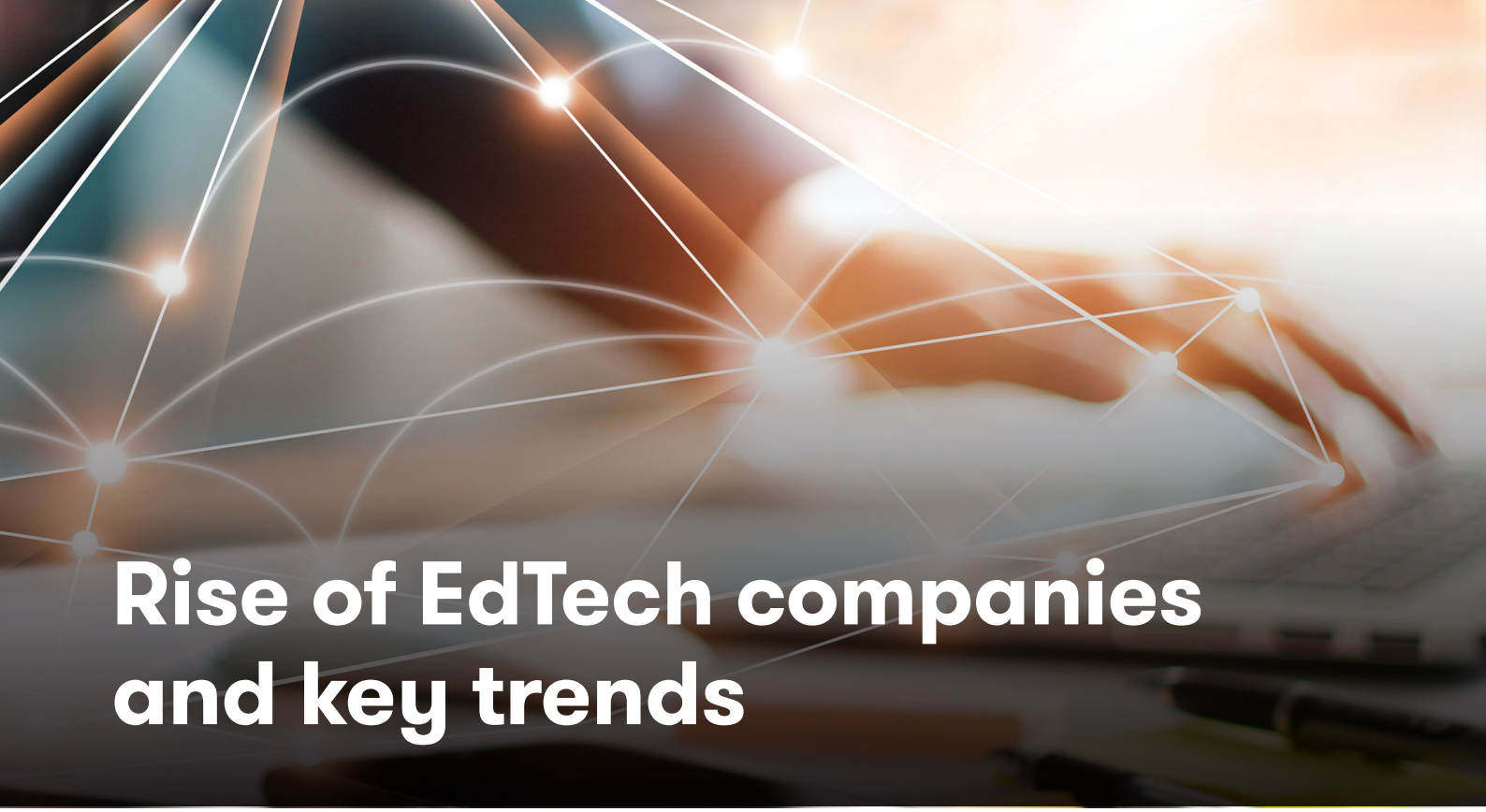
With the advent of remote e-learning, the benefits listed above were largely lost. The COVID-19 pandemic fuelled the need and compulsion to continue education in the most appropriate medium when physical educational institutions were forced to shut.

The main challenges of instruction via this medium can be listed as:

a. Devices proving to be distractive as students are tempted to watch videos and browse social media on their devices

b. Lack of focus and impatiently waiting for a session to get completed

c. Indiscipline over attendance, cyber bullying, etc.



Rise of EdTech companies and key trends

Key trends in the Indian EdTech industry

Even before the pandemic hit, EdTech was rapidly expanding in terms of its popularity and demand. However, with the emergence of newer strains of the COVID-19 virus, e-learning initiatives gained a lot of traction, thereby, underscoring their convenience, and cost-efficiency and assistance in controlling the spread of the disease.

Rise of blended learning

The growth of EdTech has been amplified by the pandemic, mostly because it is efficient, fast and convenient. In accordance with the existing situation, enhanced physical reality will be another important segment in the future of education in the coming years. Online learning with the adoption of cloud technology will be made more real with the help of metaverse, which involves the concept of AR and VR.

Value-added services with regular courses

Increased screen time demanded that e-platforms further innovate their tailored products for their target audience by offering value-added courses such as group discussions, live projects, career counselling sessions and internships, besides the regular academic and learning courses. Additionally, the open API ecosystem has enabled platforms to offer advanced analytics for students' progress monitoring, content delivery, skill mapping, personalised dashboards, etc.

Gamification of the e-learning experience

Upcoming trends, such as simulation of concepts, level advancement badges and incentive-based learning are also driving user engagement on various EdTech platforms. Hence, technology is currently being leveraged to provide an immersive learning experience to users, through improved user-interfaces to ensure better knowledge exchange. While the EdTech sector has opened many opportunities, its fast pace of growth and adoption has attracted the attention of cybercriminals on the internet.

Deals scenario in EdTech sector

Given the onset of the pandemic, as learning shifted online, Indian EdTech companies seized the market opportunity to deliver online learning which led to a growth in user base. This has led to rise in deal activity in this sector in last two years and seven months ended 31 July 2022, aggregating to **USD 11.7 billion** (414 deals).

The sudden increase in the deal activity in 2021 was the result of the onset of COVID-19 and sudden shift to the online mode of education. As a result of this, 2021 witnessed the highest number of EdTech companies getting funded and big EdTech establishments making acquisitions to leverage the current offerings, venture into the hybrid model and eye overseas expansion.

PE and VC funding

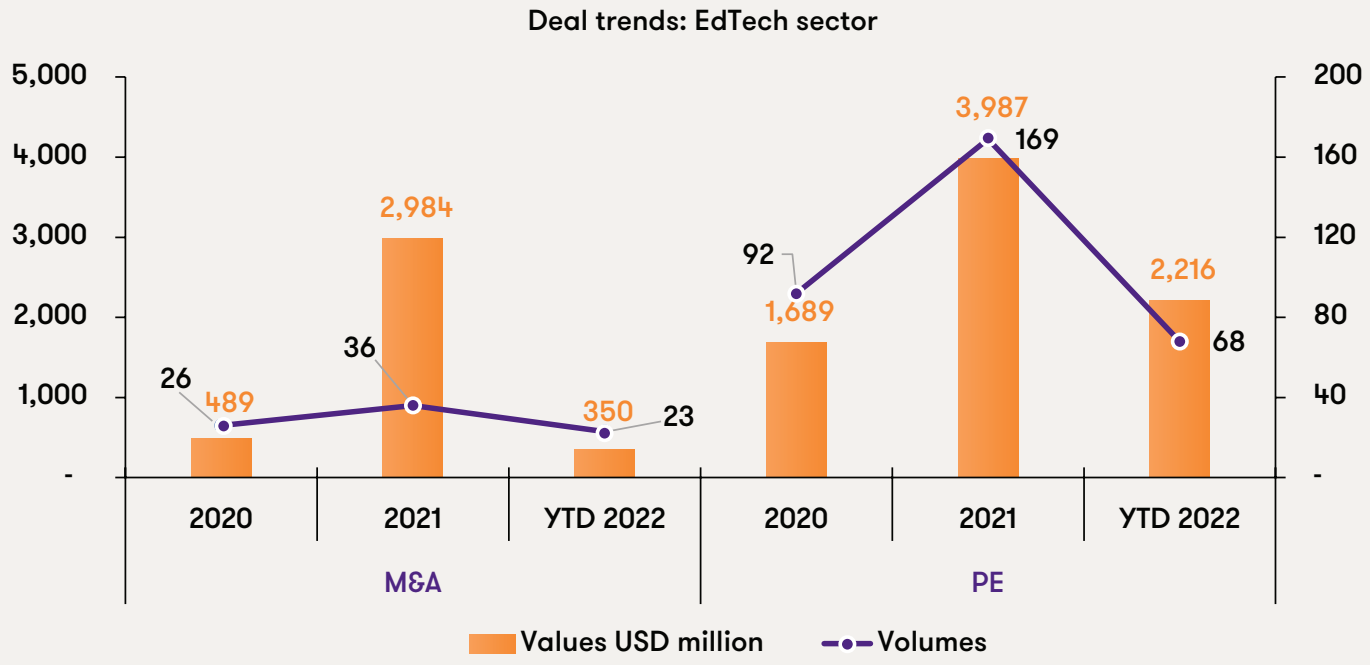
USD 7.9 billion (329 deals)

M&A deals

USD 3.8 billion (85 deals)

Last two years and seven months ended 31 July 2022

Deal trend in the EdTech sector



YTD2022 refers to seven month period ended 31 July 2022

For analysis of the top deals, please refer to Annexure to this report.

Deal analysis

Some of the top PE/VC deals in the sector include companies like Byju's, UpGrad, Vedantu, Unacademy, Lead School, Simplilearn and PhysicsWallah raising large funds.

The rise of funding in this sector has created more than seven EdTech unicorns in India and we believe India is poised to be one of the top EdTech destinations globally.

Currently, we have witnessed moderation in PE/VC funding given some of the global headwinds in fund-raising as well as moderation in valuations. As the pandemic recedes and learning has moved to offline mode, business models of EdTech companies are pivoting to the hybrid model and focus on long term profitability and sustainability.

In terms of M&A activity, some of the larger EdTech players have been acquiring companies in India and overseas to build EdTech business of a global scale and some of the active acquirers include Byju's, UpGrad and Eruditus.

Some of the noteworthy M&A deals include:

Byju's acquisition of Aakash Educational Services (**USD 0.95 billion**), which is one of the largest edtech acquisitions globally

Byju's acquisition of Epic Inc, **USD 0.5 billion**

(Reference: Grant Thornton Bharat Dealtracker)

Cyber risks and mitigation plan

India is one of the biggest targets of cyber threats to educational institutions and online platforms. Several of these cybercrimes include leaking of student databases and confidential information, thereby increasing vulnerability of the environment. Schools and universities in India have been victims of successive cyber-attacks and data breaches that have forced them to take major systems offline, which greatly impacted classroom learning during the pandemic.

Cyber risks in education

The adoption of technology has opened a pandora's box for bad actors to exploit vulnerabilities in the devices and unsecured networks used in the education sector.

Educational institutions sit on a goldmine of sensitive information viz. personal information, academic records, research data, financial records, etc., making them prime targets for cyber criminals to target.

This makes it imperative to be wary of cybercrime practices, which can be both internal and external. Internal attacks are often easier, specifically because the internal cyber criminal has access to all the systems.

Let's examine the nature of cyber-attacks that have plagued the sector:

a. **Phishing attacks:** E-mails and websites appearing as genuine from a well-known source designed to trick the user into divulging sensitive information or providing access to infiltrate the system with malicious software or malware are known as phishing attacks. The education sector is highly vulnerable to such attacks as the level of cyber awareness is low and security of systems used is also questionable.

b. **Ransomware:** Another variant of a malware where the cyber criminals threaten to publish the victim's personal data in the public domain or encrypt them permanently until a ransom is paid.
The use of remote desktop systems in school infrastructure has attracted ransomware gangs to hunt for vulnerabilities in the networks. Schools and universities do not have the security setup of corporate enterprises to defend themselves from cyber-attacks and are seen as an easy target.

Denial of Service (DoS) and Distributed Denial of Service (D-DoS) attacks: Intentional disruption and widespread unavailability of services by penetrating the institution's weak IT systems are essentially DoS attacks. A D-DoS is a variation of DoS where bad actors overwhelm the IT systems of targets for by swamping them with service requests through compromised machines dispersed geographically.

Given the weak security infrastructure in the education sector, it has witnessed many instances of D-DoS attacks where even disgruntled students and tutors with limited cyber knowledge have been able to launch attacks as a sign of protest or to make a statement.

Other instances where cyber space has been misused in the education sector are cases of cyber bullying. Cases of cyber bullying have risen enormously as certain conversations held online and over social media go viral among peer groups or a wider audience without a check, which has a huge psychological impact on the impressionable minds of students. Students influenced by peer pressure continue to engage over social media regardless of the toxicity that comes their way, unaware of the damage that it can inflict. Not all students report these incidents, which further makes it difficult to understand and remediate.

The growing threat landscape of cyber space can have adverse effects on internet users, through various types of cybercrimes. As the education sector is making progress in its digital ways, institutions and students are gradually becoming vulnerable targets of cyber criminals.

The aim of cybersecurity education is to educate students on the potential risks they face, while making use of internet communication tools, such as social media chat, online gaming, email, web browsing and messaging.

To thwart such attempts and to mitigate cyber threats, a risk mitigation plan becomes an imperative measure.

Risk mitigation plan and best practices

a. Cyber should become an important board room discussion. Institutions should have cyber risks as one of the items on their risk register, which merits equal importance to funding, public image, health and safety and public relations concerns.

b. IT teams and security officers should not be hesitant in communicating to top management the risks that weak systems pose to the organisation and why funding and management oversight is extremely critical for a cybersecurity programme to succeed.

c. Robust security and internal control in the processes, systems, infrastructure and ERP applications should be put in place by educational institutions for teaching students over digital mediums. Need based identity management protocols and multi-factor authentication can improve the security around user access.

d. Adoption of cloud security solutions that integrate all the institutions' IT devices, networks and other components.

e. Schools/institutions should create an interactive ecosystem for students to be able to easily communicate their grievances.

f. Collection, storage and dissemination of students' information should be well secured and not be exposed to potential hackers; controls over what data can be shared over which mediums viz. email and device management policies should be in place.

g. Schools should have policies that require the school management's consent before permitting teachers to use certain apps/services, which would use student's personal data.

Risk mitigation, however, need not be only restricted to education institutes. Considering that children and young students have also been victims to such vicious attacks, the following steps can be taken to lower the frequency of cyber-attacks and malpractices amongst learners while raising cybersecurity awareness.

Cybersecurity awareness

The principles of cyber awareness have been refined over the years through research in the socio-psychological arena. Children can now be equipped enough to defend themselves against possible cyber threats. Similarly, teachers can also be trained to promote critical understanding rather than restrictive approaches to cyber safety. Building the cybersecurity workforce of the future and integrating cybersecurity awareness need to be made top priorities to safeguard national security.

School administrations can also set up cyber cells within their premises.

Cybersecurity education

Given the fast rate of increasing cyber risks, cybersecurity education is now becoming a popular stream in higher education and vocational training. Cybersecurity education can be implemented in several ways:

- Cybersecurity courses could be offered to adult learners through online professional development programmes. In addition, students studying business, law and criminal justice can also be exposed to ideas such as advanced cyber intelligence skills to conduct better due diligence, online research, litigation, anti-money laundering measures, market analyses, etc.
- By incorporating lessons of cyber safety, schools will become knowledge centres that will disseminate information on issues around cybersecurity to the community. School administrators and teachers can also organise workshops and programmes circling cybersecurity.

Hence, to successfully tackle the issue of cybercrime, it is important to implement preventive methodologies amongst the frequently targeted groups.

Annexure

Top M&A deals

Acquirer	Target	Deal value (USD million)	Deal type	% stake	Domestic/ Crossborder
Think & Learn Pvt Ltd - Byju's	Aakash Educational Services Ltd	950.00	Acquisition	100%	Domestic
Think & Learn Pvt Ltd - Byju's	Great Lakes E-Learning Services Pvt. Ltd - Great Learning	600.00	Acquisition	100%	Domestic
Think & Learn Pvt Ltd - Byju's	Epic! Creations, Inc	500.00	Acquisition	100%	Outbound
Eruditus Executive Education	internalDrive, Inc - iD Tech	200.00	Acquisition	100%	Outbound
Think & Learn Pvt Ltd - Byju's	Neuron Fuel Inc- Tynker	200.00	Acquisition	100%	Outbound
Think & Learn Pvt Ltd - Byju's	Toppr Technologies Pvt. Ltd - Toppr	150.00	Acquisition	100%	Domestic

Source: Grant Thornton Bharat Dealtracker

Note: Deal values and details are as per publicly available information and should be considered indicative only.

Some excerpts from the NEP 2020[1] on technology in education

a An autonomous body, the National Educational Technology Forum (NETF), will be created to provide a platform for the free exchange of ideas on the use of technology to enhance learning, assessment, planning, administration, and so on, both for school and higher education.

b A rich variety of educational software, for all the above purposes, will be developed and made available for students and teachers at all levels. All such software will be available in all major Indian languages and will be accessible to a wide range of users including students in remote areas and Divyang students.

c Appropriate education agencies will be identified to conduct a series of pilot studies, in parallel, to evaluate the benefits of integrating education with online education while mitigating the downsides.

d Need of investment in creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration.

e Appropriate existing e-learning platforms such as SWAYAM, DIKSHA, will be extended to provide teachers with a structured, user-friendly, rich set of assistive tools for monitoring progress of learners.

f A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed, with a clear public system for ratings by users on effectiveness and quality.

g Existing e-learning platforms will also be leveraged for creating virtual labs so that all students have equal access to quality practical and hands-on experiment-based learning experiences.

h Teachers will undergo rigorous training in learner-centric pedagogy and on how to become high-quality online content creators themselves using online teaching platforms and tools.

1. Ministry of Human Resource Development, Govt. of India (2020) NEP 2020. Available at - https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

About PHDCCI

PHD Chamber of Commerce & Industry, a leading Industry Chamber of India, ever since its inception in 1905, has been an active participant in the India Growth Story through its Advocacy Role for the Policy Makers and Regulators of the Country. Regular interactions, Seminars, Conference and Conclaves allow healthy and constructive discussions between the Government, Industry and International Agencies bringing out the Vitals for Growth. As a true representative of the Industry with a large membership base of 1,30,000 direct and indirect members, PHD Chamber has forged ahead leveraging its legacy with the Industry knowledge across sectors (58 Industry verticals being covered through Expert Committees), a deep understanding of the Economy at large and the populace at the micro level.

At the National level, the PHD Chamber is well represented in 16 States with its own offices and MOUs with eleven Partner Chambers in different States.

At the Global level we have been working with the Concerned Ministries, Embassies and High Commissions to bring in the International Best Practices and Business Opportunity.

PHD Chamber has special focus on the following thrust areas

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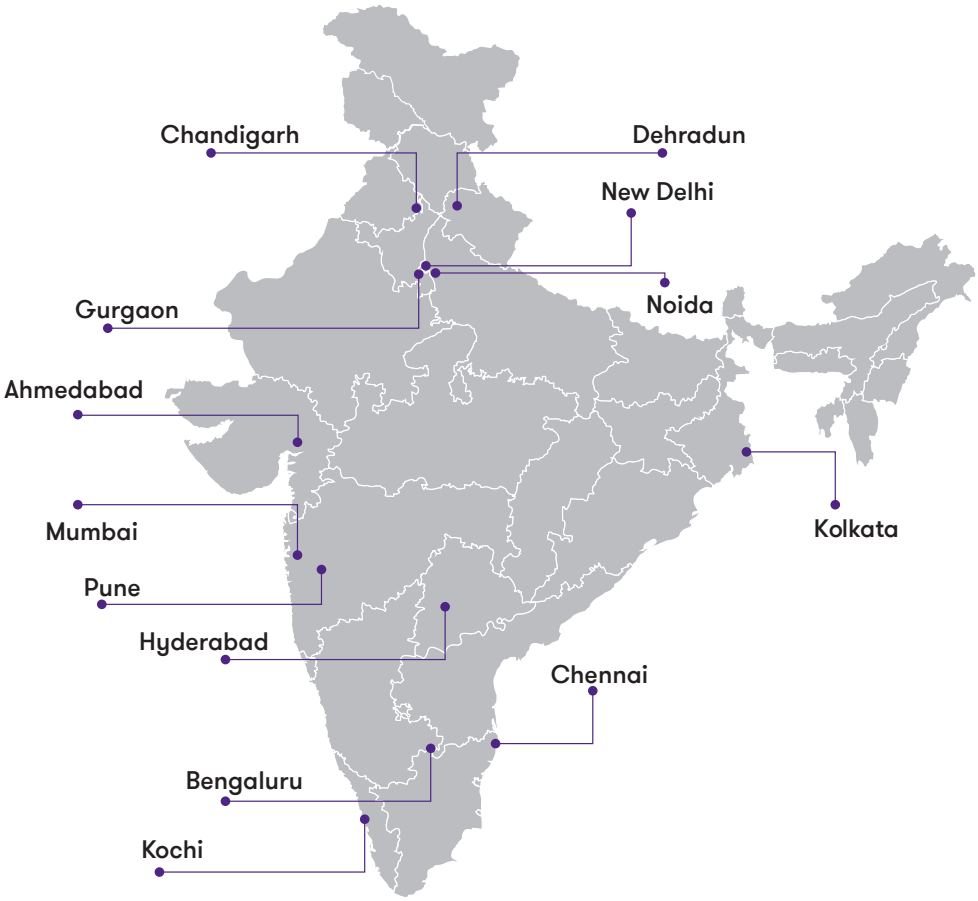

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