

A Study of Strategies and Impact of Digital Transformation in Education Sector in Patna

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Abstract

The sudden outbreak of COVID 19 forced all the educational institutions for digital transformation. Educational institutions over the state had adopted online teaching-learning approach to meet the needs of the educational institutions and students. This paper sought to an act of measuring the impact of COVID-19 pandemic and finding the strategies used for the digital transformation in the education sector in Bihar during first lockdown phase. In order to find the strategies used for the digital transformation and to measure the impact, the study tracked the rate at which the virtual tools were used by various schools and institutions during the COVID-19 lockdown. However, the major concern is about the quality of learning which is closely related with how well the online content is designed and executed and it is also depends on the learners digital access and efficiency. A Survey was conducted among different government and private schools and colleges, also from the secondary sources, mainly newspaper articles, magazines and peer-reviewed journals. The findings are that, in Bihar, during the lockdown, a variety of virtual tools were implemented from primary education to higher and tertiary education where educational activities switched to online learning. These observations point to the fact that Bihar has some challenges to drive the education sector to the next level, which has the potential to increase access. Our survey was focused on the experience, feelings and overall expression of the students regarding to digital education and recent changes. Moreover, the survey contains questions about technical preparation and infrastructure. The responses are processed by well-known statistical data analysis tools.

The findings of the study show that 88.3 percent students responded that they had no experience of online classes before the COVID-19 pandemic. The mostly used device for online classes by students was smartphone (53.2 percent) followed by laptop and mostly used application for communication is WhatsApp and ZOOM. For conducting online classes most used platform is ZOOM. For internet access the students were found mostly relying of mobile data pack (92.4 percent). Further, the finding reflects that lack of connectivity (65.5 percent) was the major constraint of online classes, followed by data limit (63.4 percent), data speed (62.6 percent), lack of device (57.1 percent) and unsupported learning environment at home (55.8 percent) were also the major constraint of online learning. Similarly, lack of human touch (54.9 percent).

Keywords: COVID-19, Digital Transformation, Education.

I. INTRODUCTION

Education is a Fundamental Right according to Indian constitution. India has one of the largest education systems in the world. Digital transformation is a process to integrate digital

solutions in any area leading to innovative approaches. As far as education sector is concerned in India, this digital transformation process has been very slow, limited to the occasional use of ICT tools(Laptops, LCD projectors and Smart boards etc for illustrations)

and certain educational sites or videos by most of the institutions as adjunct method of delivering additional information during the Teaching Learning process. The reasons are many which includes no standard regulation and policies, lack of resources such as hardware, software and of technical expertise, economic constraints etc. to name a few.

Against this backdrop, the primary area of concern was to assess the actual status of digital learning and its transformation during the pandemic period in Patna district -

The objective of this research was to measure the impact of Covid-19 pandemic in unleashing digital transformation in the education sector of Patna. In order to measure this impact the study tried to track the rate at which digital tools were used by various educational institution during this period. The data was obtained through online and offline survey conducted among the students at the secondary level and at the college level.

II. Literature Review

The review of literature has shown various studies have been conducted to identify and assess different aspects of digital transformation and e-learning at the national or international level. The research gap is found when it comes to the study of Digital transformation and the perception of the students/e-learners towards e-learning during Covid-19 pandemic period in the state of Bihar specifically, when e-learning emerged as the only option to continue learning.

A growing number of students are now opting for online classes. The traditional classroom modality, restrictive, inflexible, and impractical. In this age of technological advancement, schools can now provide effective classroom teaching via the Web. This shift in pedagogical medium is forcing academic institutions to rethink how they want to deliver their course content (Paul and Jefferson, 2019). They found that there was no significant difference in student performance between online and face-to-face learners overall, with respect to gender, or with respect to class rank. COVID-19 pandemic challenged the education system across the world and forced educators to shift to an online mode of teaching overnight. Many academic institutions that were earlier reluctant

to change their traditional pedagogical approach had no option but to shift entirely to online teaching-learning. Online Learning has been a panacea in the time of COVID-19 pandemic (Dhawan, 2020). Similarly, Yang and Cornelius (2004), found that flexibility, cost-effectiveness, electronic research availability, ease of connection to the Internet, and well-designed class interface were students' positive experiences. Panda, et. al. (2020), on the other, found that internet speed and technical issues were revealed to be the main constraints of this format, whereas flexibility, availability of content for revision, and fewer distractions were the positive features. On the other hand, the students' negative experiences were caused by delayed feedback from instructors, unavailable technical support from instructors, lack of self-regulation and self-motivation, the sense of isolation, monotonous instructional methods, and poorly-designed course content Yang and Cornelius (2004). Similarly, Panda, et. al. (2020), found that the majority of the students and faculty felt that online teaching could not replace traditional face-to-face teaching. Blackmon and Major (2012) in their study found that some students were satisfied with their online courses but still struggled with balancing online courses and work responsibilities. Other students found that enrolling in an online program related to their jobs was very beneficial. Based on the findings of the study undertaken by Sun and Chen (2016), they argued that effective online instruction is dependent upon; well-designed course content, motivated interaction between the instructor and learners, well-prepared and fully-supported instructors; creation of a sense of online learning community; and rapid advancement of technology. However, Jena (2020) suggest that; Educators and learners should be trained to utilize online teaching learning process using technology. Policy should be adopted by Government/educational institutions to provide free internet and free digital gadgets to all learners in order to encourage online learning. Further, establishment of quality assurance mechanisms and quality benchmark for online learning programmes must be developed and offered by higher educational institutions in India keeping in view of rapid growth of the online learning platforms. Further, academic assessment of the students may be done through online mode or through quizzes and small projects. During this pandemic, the institutions

should focus more on virtual educational activities including television, radio and web-based education. Similarly, Panda, et. al. (2020), suggested the uses of animated and video content would help students' understanding and retention of topics. Frequent summative and formative assessments are vital to draw attention, help with retention and address the issues relating to learning and teaching. Blackmon and Major (2012) in their study found that some students were satisfied with their online courses but still struggled with balancing online courses and work responsibilities. Other students found that enrolling in an online program related to their jobs was very beneficial.

The Indian education system gets its contribution from both the public as well as the private sector. It is controlled by Central Government as well as the state government. Various National organisations like NCERT (at school level) and UGC (at university level) play a key role in developing policies and programs that prepares a national curriculum framework. Each state has a counterpart called SCERT, which propose educational strategies, curriculum, pedagogical schemes and evaluation methodologies to the states departments of education and generally follow the guidelines established by the NCERT. The states have considerable freedom in implementing the education system within the state. In the Indian education system, the school education involves 10+2 format - ten years of primary and secondary education followed by two years of higher secondary education. The Bachelor's degree, is obtained after three years study in the case conventional faculties of Arts, commerce and Science, and four years in the case of most of the professional degrees. The post graduate degree programmes are of two years duration.

In India, while the digital India campaign had sown the seeds of digital transformation, the E-learning methodology was taken up as an adjunct method of learning in the majority of educational institutions. The COVID-19 pandemic forced large scale digital adaptation in every sector. Education sector being one of them was forced to adopt digital strategies to overcome the setbacks that were felt in education delivery process due to the lockdown. Most of the institutions were compelled to use

different modes of E-learning during the pandemic. And, now it is believed that this mode of learning is here to stay. It is expected to constitute at least 40 to 50 percent of the formal learning structure, with some organisations expecting this figure to reach as high as 90 percent. While virtual has become the new normal, it is crucial to ensure learning is interactive given today's digital learner's jobs, behaviours, habits, and preferences.

Objective

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III. E- Learning

1. Introduction

E-learning is a type of learning system which utilizes electronic technologies to access educational curriculum inside or outside a traditional classroom using electronic resources. Technology-based e-learning uses the Internet and other computer/web-based technologies to produce materials for teaching and learning. In a broader sense, learning that is enabled electronically or learning that is empowered by using digital technologies in e-learning. It can range from straightforward content on CD to live video conferencing in the virtual classroom. It provides greater flexibility of access and benefits of specialized and customized training programs. The e-learning tools are accessible 24/7 and from anywhere in the world. This teaching methodology can be implemented in or out of the classrooms using computers and the Internet forming the significant component of e-Learning.

E-Learning can also be termed as a network-enabled transfer of skills and knowledge, and the delivery of education is made to many recipients at the same or different times. Earlier, it was not accepted wholeheartedly as it was assumed that this system lacked the human element required in learning. However, today's learners want relevant, mobile, self-paced, and personalized content. This need is fulfilled with the online mode of learning, and students can learn at their own pace and within their comfort zone. In face-to-face learning, the location limits attendance to a group of learners who have the ability to participate in the area, and in the case of time, it limits the crowd to those who can attend at a specific time. E-Learning, on the other hand, breaks all these barriers.

With the rapid growth and development of the Internet, information technology and multimedia, radical changes have been observed in the traditional process of teaching & learning. It has generated more choices for today's education. The educational institutions have recognised e-learning as having the prospect to transform people, knowledge, skill and performance. The introduction and expansion of a range of e-learning tools have brought several changes in their educational delivery and support process.

2. Types of E-learning

E-learning can be broadly classified as Synchronous e-learning, Asynchronous e-learning and Blended e-learning. Synchronous e-learning is a real-time activity that requires the online presence of all the learners and instructors, which means all the participants, i.e., the teacher & students are online and interact at the same time from different locations. They deliver and receive the learning resources via mobile, video conference or Internet chat. They share their ideas and queries and get detailed solutions. This method has gained popularity with improved digital technology and Internet bandwidth for example- Virtual classrooms, webinars, etc.

On the other hand, in Asynchronous e-learning, learners and instructors log in at their convenience. The instructors and peers provide feedback on their schedules. This creates a self-paced learning environment. It is a kind of pause and resumes learning. It is information accessible on a self-help basis 24/7 and offers

the learners the information whenever they need it. Asynchronous learning technologies like blogs, e-books, CDs, DVDs, discussion forums, etc.

A new form of e-learning is blended e-learning which is an amalgamation of synchronous and asynchronous learning methods whereby an online trending can be provided using virtual classroom and also gives CDs for self-study.

IV. Current Scenario of E-learning in India

With technology globalisation, the concept of teaching and learning has witnessed a paradigm shift, promoting access to quality learning resources anytime, anywhere, connecting the learners and cutting across all boundaries and constraints. The significant changes in the use of technology in online education have seen the emergence of the concept of MOOCs, i.e., Massive Open Online Courses. They are the most popular way to offer courses online.

In India, the institutes with the organizational capabilities, along with the governing authorities, are trying to serve the growing educational needs of the learners by offering Online Courses in the country. These efforts are in the growing stage and are trying to serve at the rate of growth in demand. Top institutes (IITs, IIMs, IISc) and authorities like UGC, AICTE, MHRD have always been involved in serving quality education. Some of the projects serving currently for providing online education is NPTEL, mooKIT offered by IIT Kanpur and IITBX of IIT Bombay. Very recently, an initiative started by the Indian Government is "SWAYAM." It started with a goal to serve at an enormous scale and cope with the learners' increased needs.

V. Current status of Digital learning in Bihar.

At school level (Govt. initiative)

State has been carrying out offline and online academic activities and imparting textbook lessons to students of class I to XII. Some of the digital initiatives of School Division includes Unnayan Bihar. Unnayan Bihar is a holistic learning project providing quality education in

schools through interactive video lectures, supplementing the efforts of school teachers, improving the learning outcomes of the students and increasing enrolment and attendance. “Unnayan Bihar” program started across the state in 5646 secondary/higher secondary schools during 2019-20. The program was launched on 5th September 2019 by the Hon’ble Chief Minister of Bihar Mr. Nitish Kumar. Unnayan Bihar is a multi-platform model which runs online as well as offline. In the offline model, Students are being taught through the animated concept videos which have been developed on the basis of Bihar Board textbook syllabus. Once the concept is being taught to the students, a short MCQ based test is being taken based on the concept which is being taught. Once the test has been conducted, students are asked to exchange their answer copy among themselves and the answers are being assessed by the students themselves. Peer Assessment helps students to better their understanding of the topic in a non-threatening environment. After the test gets assessed, teachers discuss the correct answers with the students and if any student doesn’t understand the content, the teacher explains that part again to the students with the help of the video. A weekly test is also conducted based on the topics taught in the week. Tests are done on the OMR sheet and these sheets are uploaded by the teachers on the reporting portal where it gets assessed using Artificial Intelligence and the weak spots of the students are identified.

In the Online model, students can download Unnayan App: Mera Mobile Mera Vidyalaya” from Google Play Store and access the e-content as well as they can ask their doubts on the mobile platform and get their answer from Global Expert. For reporting of the program, teachers are asked to report on a daily basis using the Unnayan Teacher App which has been developed. Teachers can select the topics taught along with the photograph of the class and attendance of the day. For the weekly test, OMR sheet has to be scanned on the App for each student and the evaluation is being done using Artificial Intelligence on the App itself. Monitoring of the program: For monitoring of the program, a dashboard has been created where the detail of each school district-wise and block-wise is available. The reports the teachers update on their app can be seen on the dashboard realtime. A State Project Monitoring Unit

(SPMU) has been formed which is dedicated to monitor this program.

During the lockdown and uncertainty over reopening of schools, an online learning programme/ initiative namely ‘Mera Doordarshan - Mera Vidyalaya’ has played a significant role to continue the learning process of students across the State. Also “Vidyavahini Bihar App” has been developed and e-textbooks of class I-XII have been uploaded on it. e-contents and other digital learning materials developed by the State are also available on the Mobile App “Mera Mobile Mera Vidyalaya”, official website www.bepcssa.in and YouTube channel of BEPC.

A Program on Doordarshan has been developed and MOU signed with DD-Bihar for broadcasting the classes for 1 to 12 in five slots from the second week of April 2020. Morning 9am to 12 noon and 3pm to 5pm. These classes are comprehensive in nature, both academic and life skills, safety and security both personal and online safety lessons are provided to children. The academic calendar of Bihar is followed. UNICEF provides support in content development for all the episodes. A discussion is initiated with All India Radio to reach out to children who have no access to TV or mobile. Technical content is being developed by UNICEF together with the Bihar Education Project Council.

Digital Portal

Bihar Education Project Council has also created a digital learning platform which is used to telecast the episodes of all the classes. <http://www.bepcssa.in/en/digital-learning.php> The portal provides e-based material and live telecast for classes from I to XII.

Web Based Learning

Bihar Education Project Council has initiated the YouTube channel to share the digital content for teachers & students, which can be visited using the link given below: https://www.youtube.com/channel/Uck-LGy9rQLi6t_A3UXw2GTQ.

Besides these govt. initiatives, there are many educational sites like khan academy and mobile apps by NCERT and Youtube videos which students could look up to for their educational endeavours. The students can also enroll in

different MOOCs offered by NPTEL, SWAYAM, and COURSERA etc. to broaden their learning horizons.

Apart from the online resources, WhatsApp groups/webinars/Google/Zoom meet can be used by Teachers to connect with their students directly and conduct online sessions for carrying out teaching process. It is being used in most places but the biggest hurdle is the lack of devices and connectivity issue.

VI. Methodology

The research was carried out with an intention to find out the awareness level amongst the students about the digital tools available to enhance their educational pursuits. The target group included students belonging senior secondary level, degree and postgraduate students. A survey was conducted using both online and offline method to reach out to a larger group of students during the pandemic period the participation in this research was voluntary. The survey consisted of 30 questions which could be divided into 5 Sections. Initially the student's personal information was collected to ensure that no duplicates are found in the results. Each group of question focused on a particular aspect of digital transformation and tried to register different viewpoints about the digital transformation of education during the pandemic period. Through this survey we tried to explore the feelings and the overall perception of the students regarding the digital education and the recent changes in the teaching and learning process. For this survey we reached out to the students of around 20 Government schools and 10 private schools and around Government colleges and an autonomous college in Patna district.

1) Awareness and availability of Resources: Awareness and availability of the digital tools be it the Hardware, Software, Internet Connectivity are the soul of Digital education. The mere success of Digital education depends on this factor.

2) Ease of learning - User friendly devices, softwares and learning environment are keys to successful learning outcomes. A student will learn more if he can focus more on grasping the learning outcomes of his course content than

fumbling on the devices/softwares/ technical nitty gritty.

3) Technical support and guidance: The technical conditions are the pillars of the digital education, If these are not met, the student is severely disadvantaged in terms of learning. The student will be not be able to learn the curriculum despite sufficient mental ability or motivation.

4) Emotions: Emotion and learning are deeply connected and the relationship between them affects academic performance. Emotional feelings affect our attention, retention capacity and for rational thinking. In traditional teaching methods, face to face interaction with the peers and teachers helps in learning process making the learner a more confident person over the years with a strong mental health. Therefore assessing the emotions is a key indicative factor in measuring the success of digital learning.

For Students

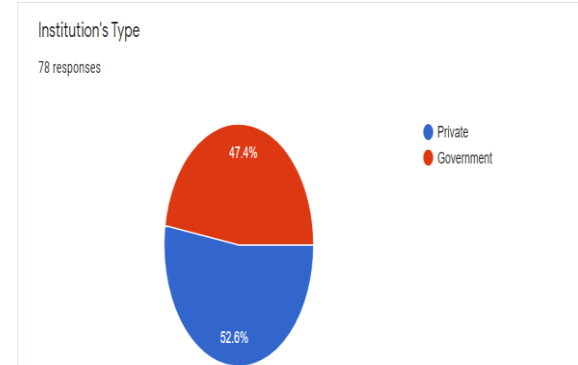
College / School	Male	Female	UG/ 9-10	PG/11-12
A.N. College	7	2	--	All
B.N.College	2	0	All	--
Carmel High School	0	3	All	--
DPS	2	0	All	--
Himalaya Public School	1	0	----	All
J.D Womens	1	0	All	
Nalanda Open Univ	0	1	---	All
Patna Science College	1	0	All	---
PWC	0	43	41	2
RPS College	0	2	All	--
Rajkiye Kanya Madhya Vidyalaya	0	3	All	--
Arvind Mahila College	0	1	All	--

Bankipur Girls High School, gandhi Maidan	0	1	All	--
TPS College	0	1	--	11-12
College of Commerce	0	1	--	11-12
Gardanibagh Girls High School	0	1	--	11-12
Sri Ram Lakhan Singh Yadav Sarvaodaya Senior Secondary School, Punaic hak	0	2	--	11-12
BD College	0	1	All	--
Islamia Urdu High School, Phulwarisharif	0	1	All	--
Total	14	63	--	---

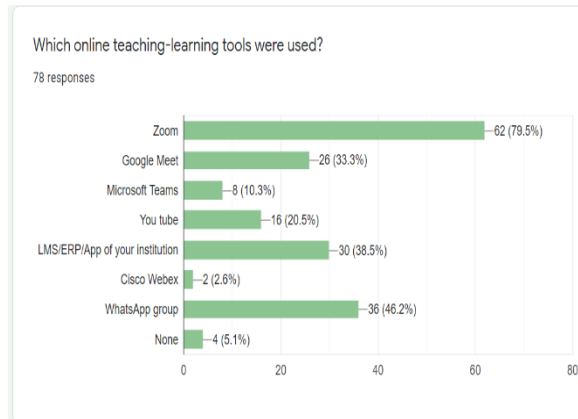
VII. Findings and Result

The survey findings reveal that almost all respondents' have switched to some form of distance learning since the beginning of the COVID-19 crisis, and over 60% believe that school / college practices will not be the same when they reopen, with more online/distance teaching and learning than before. For two thirds of respondents, the closure of schools has led to their first experience with online teaching, which has been both positive and challenging.

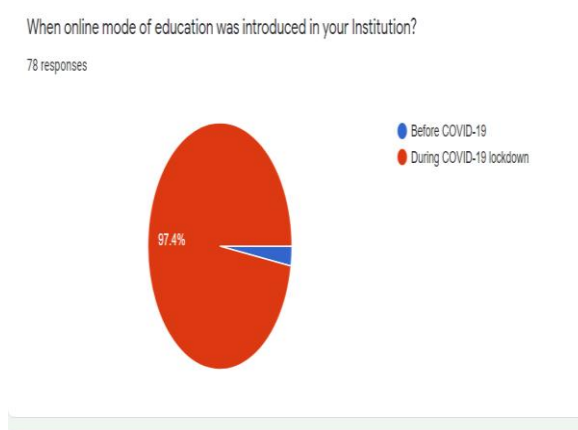
Total 78 respondents of different Schools and Colleges were collected. 53% Private Institution Students and 47% Government Institution Students had participated.



Mostly students were aware of online education, but they get more familiar during Covid-19 pandemic.



Following the consultation carried out, the results are collected in three blocks corresponding to: (1) the availability of tools for the adaptation to e-teaching; (2) the opinion on the teaching given and received, the time dedicated in this new teaching method and the differences that it presents compared to face-to-face teaching; and (3) concern regarding the evaluation of this teaching provided and the level of satisfaction with respect to the measures adopted and the new educational system.

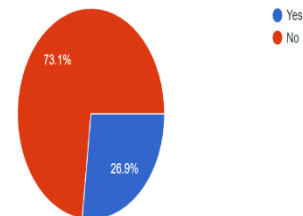


Survey shows that the digital transformation due to the COVID-19 was not smooth and without challenges but half of the students liked it and they would prefer it in the future. Our analysis allows to draw a few remarks and conclusions. Firstly, half of the students preferred online education and they are willing to continue it. Secondly, the students who had no technical issues would prefer to use their own devices during the tutorials. Finally, the students who will not prefer online education are divided by technical issues and other concerns. Online education was considered successful because about half of the students would prefer it in the future. Almost all of these responses agreed upon that weekly classes are necessary. Hence, they would like to learn from home with the well established schedule of semesters. Acceptance of rescheduled training like intensive courses would require further investigation because there were no specific questions about it. Current results show that the students think that weekly classes are indispensable. These students did not mention technical issues and had the necessary infrastructure. The survey showed that many students are willing to use their own configuration in the future instead of the laboratories if it is possible. This observation suggests a change in the laboratories where tutorials were held. Currently, the students work on the local computers during the tutorials but they can work on their own computers too. Based on our prior experience, some of the students use their devices regardless the labor environment. The current results confirmed this observation and it suggests some changes in our laboratories. Based on these results, the installation of workplaces without computers was suggested where the students can dock their own computers. This transformation may improve the students' performance in the tutorials. Students, who do not prefer to continue the online education, are divided into two categories. Half of them had some sort of technical issues and the other simply did not like the online education. These technical issues may be related to hardware or software. Hardware related problem should be solved by the students. Software related issues may be caused by the huge variety of platforms and tools that are used in different courses. Step by step tutorials or configured virtual environments could be used to improve the students' online learning experience.

Online Education experience before COVID-19

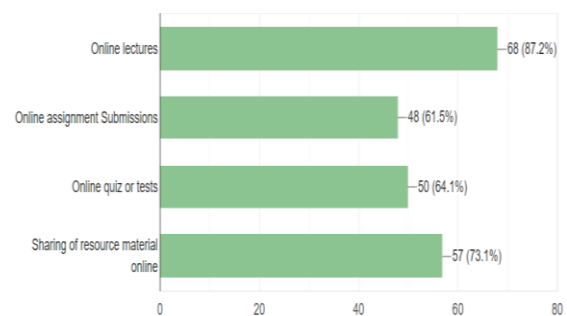
Before COVID-19, did your institution used any online teaching learning tools like Zoom, Google Meet, Cisco Webex, Microsoft Teams etc. for conducting your classes?

78 responses



For what purpose online teaching learning tools were used?

78 responses



Impact of E-learning

The inclusion of e-learning, especially in higher education, has several benefits as it focuses on learners' needs, such as fast and a vast access to learning resources cutting across geographical boundaries in few clicks, giving a choice of time and place of learning taking into consideration the individual learners' difference in terms of the pace of learning or parts of content on which they want to focus in a particular course. Reduced cost compared to traditional forms of learning as the learner is relieved of paying for travel, accommodation, etc. It also curtails the cost of bringing a trained person and creating the infrastructure of learning at multiple locations.

E-learning helps compensate for the scarcities of academic staff, including instructors or teachers, facilitators, lab technicians, etc. It is an Eco-friendly mode since e-learning is paperless

learning; there is a reduction in deforestation, less CO₂ emission and less power consumption.

E-learning provides opportunities for relations between learners by the use of discussion forums. Through this, e-learning helps eliminate barriers that have the potential of hindering participation, including the fear of talking to other learners.

E-learning motivates students to interact with other, as well as exchange and respect different point of views. E-learning eases communication and also improves the relationships that sustain learning. Wagner et al. (2008) note that e-Learning makes extra prospects for interactivity between students and teachers during content delivery

However, some of the weaknesses of e-learning methodology need careful consideration. Because of the inherent freedom of time and pace, e-Learning often translates to no learning. There is no fixed schedule or routine, and e-Learning can become difficult for people to meet specific deadlines or goals. While e-Learning can be pretty interactive these days, through video conferences, webinars, and face-to-face video chat, it still is not the same as sitting across the room from a natural person. In simple terms, it can be said that there is no substitute for interacting with and learning from a fellow human, which later leads to no competition with fellow students.

Despite having adequate resources, there is no proof that all the sites or apps that provide e-Learning provide authenticity of its content. Along with authenticity, there is also the problem of the extent of security of online learning programs. Furthermore, to use e-learning resources, one needs to have a primary computer and technical knowledge of using such resources, failing which people may find the concept and/or execution of e-Learning challenging to grasp. Other potential technical issues can include the availability of hardware and software, its cost of maintenance and a slow Internet connection, specific browser requirements, poor device compatibility and so on.

CONCLUSION

The paper examines digital transformation of education among students of higher secondary and graduation level in Patna district. The survey consisted of question groups, namely Availability and awareness, ease of use, technical support, and emotions. A data set is constructed using the students' responses, which is analysed using well-known methods. The presented experimental results and exploratory analysis gives some insight into online education experience and may set further directions. Based on the results, the digital education can be considered successful. The students enjoyed the digital education and half of them are willing to continue it in the future. Students would prefer to use their own devices during on tutorials which allow some changes in the labor environments. Unfortunately, some students had technical issues which may be caused by the heterogeneous software environment and can be solved with support material. Therefore, the successful utilization of the digital education can be achieved in the near future

To drive the digital transformation of teaching and learning within higher education institutions, it is paramount to understand the technology skills and knowledge of both teachers and students, to discover their respective needs, and to aim for a mutual understanding of both perspectives (bottom-up). Beyond that, a sustainable implementation of digital media can only succeed if the overall project 'Digital Transformation in Higher Education' is grounded within the current context of the university, and is supported and pushed by the university administration (top-down).

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