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Review Paper

Education Technology and E-Learning Sector in enhancing Knowledge Management Systems: *The Growth, Financial and Economical Concern in Indian Context*

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ABSTRACT

Digital Education is an interdisciplinary field of practice and advancement of technological applications in education and entire teaching-learning process. Digital Education is helpful in healthy and sophisticated educational operation as well as administration. It is important to note that 'Digital Education' and 'Online Education' is not the same but there is a misconception between these two, as Online Education is smaller than Digital Education and it convey not only Online Education but also ICT applications in Educational Management, E-Learning, etc. The ICT integration in Education Sector make Education field as technology-centric. In the last few years the Education Technology industry grown significantly, while it was started from a very low budget and during 2014-2019 the funding was about 88% with an investment of $1.8B. According to the expert in Digital Education two growing segments and area for funding are online certifications and also conducting the test. The Digital Education uses by different means user becomes doubled just in one year as per statistics. It has shown that in 2019 it was 45 Million whereas in the year 2020 the user base recoded as 90 Million in 2020. The continuous development of the Education Technology, growth and development helps in reaching Digital Economy and Knowledge Economy status in many countries. This paper highlights about the basic of Education Technology and its foundation and financial growth in India. Paper also depicts the basic issues and concern of Digital Education and EdTech and how finance and funding can be a worthy deal for advanced and sophisticated Education Technology practice.

HIGHLIGHTS

- Digital Education is the need of the hour comprises with the ICT Digitally and also ICT applications in traditional education.
- The growing Information Technology in Education, Teaching and Learning lead the development of Education Technology sector and it is booming in Developed and Developing country too.
- In respect of Indian EdTech Market, it is growing since last one decade but most significant growth can be noted before the pandemic and post pandemic in significantly.
- EdTech finance and monetary problems may solve the issues of technological apps purchasing, infrastructure purchasing and development, finance in awareness building, content development, etc.
- It is expected that EdTech industry will reach 10.4 billion USD in coming years and preferably within 2025 as per major tech-market research organizations.

Keywords: Information Technology, E-Learning, Knowledge Management, Tech-Finance, Digital Economy, Digital Education

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Digital Education is combines with both technology (i.e. IT) and education, and this is highly beneficial for sophisticated and advanced educational practices and this may ultimately lead the effective teaching-learning practice supported by various sub-fields of IT which include Networking Technology, Communication Technology, Database Technology, Software Technology, Multimedia Technology etc. in respect of healthy and advanced designing and development of educational product and contents (Blikstein, 2013; Paul *et al.* 2012; Jena & Das, 2013). Educational Technology in Education led many nomenclatures such as Communication Technology, Database Technology, Digital Learning, Online Education, and ICT in Education are also simultaneously being used in place of Digital Education. Education Technology is enhancing general teaching-learning practices including the examinations and evaluations, educational management and administration and other forms of Digital Education, which includes (Paul *et al*. 2023)—

- Adaptive systems of teaching-learning,
- Electronic and Digital textbooks,
- Learning and educational contents,
- Objects, systems and analytics,
- Open educational content,
- Free educational content and systems,
- Streaming content,
- Advanced learning systems enabled with the technology, etc.

Digital Education treated as a field of practice and now a day's also as an educational program and offered as Bachelors, Masters, and Doctoral degrees. There are some subjects available in the allied areas such as Educational technology is a field of practice supported by ICT in educational management and practices. Digital Education is supported by healthy knowledge transfers digitally including proper development of the learners and teachers for effective and variety of educational processes including traditional on-campus education systems. In 'Job based or On Job Training' also technology becomes important and integral part and Education Technology helps in this regard and as a whole for the Continuing Learning and Education, Skills development, etc, including in case of blended learning. Digital Education is another technology based education supported for the effective infrastructure (Buchanan, 2011; Dillenbourg, 2016; Hiltz & Turoff, 2005). There is urgent need in developing proper manpower those who can develop and manage the infrastructure as well as proper development in contents. Users of Digital Education should be Digitally educated by common Computing literacy drive. It is difficult to organize Education Technology practice properly without adequate funding and financial support including societal and educational institutions adjustment. It is worthy to note that Digital Education is not only about offering the education by online mode, it is about the integration of Digital Technologies in Education and other allied activities such as Educational Leadership and Administration (Dunleavy *et al.* 2019; Ozga, 2016; Jena, 2013).

As we all know that COVID-19 affect entire educational system i.e. traditional education and as far as lockdown period is concerned students and learners basically *accustomed* in many case with the Online Education. Moreover in post-COVID-19 also many are using Online Educational Systems parallel with the onsite mode of education or depending upon need and situation, place, and other important concerns. Today many EdTech institutions and organizations have started Online Education or offering technological solutions to the traditional institutions in regard to perfect educational operations. Many are supporting 'Online Education' and on the other hand few are not in a position to prefer this mode of education.

In India many organizations and companies going to get 'Soonicorn' status due to increasing online and digital education market. There are organizations and companies in this possible or achieved list such as Unacademy, Upgrad, Toppr, and Venantu due to reaching the financial valuation of 1 Billion USD. Though some other companies also are in list and enhancing their self, though many of them are in process of the monetize the service and solutions. Start-ups in this category are doing well in healthy and sophisticated functional value which includes offering doubt clearing session, enhance content delivery, training related videos, exam and test preparation, offering online lectures and sessions, etc. (Edwards, 2015; Elboubekri, 2017; Paul *et al.* 2023). According to a study of 2020 a majority of the

EdTech market in India was dominated by Byju's (i.e. 57.5%) and a complete facts represents in Fig. 1.

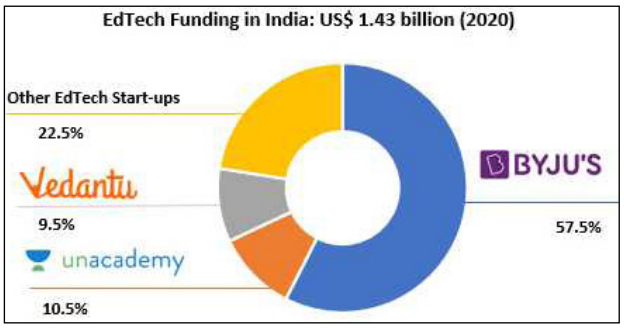

Fig. 1: Funding in Education Technology industry in India during 2020

OBJECTIVE OF THE PAPER

The present work titled 'Education Technology and E-Learning Sector in enhancing Knowledge Management Systems*: The Growth, Financial and Economical Concern in Indian Context'* is a theoretical one and deals with following aim and objective—

- To know fundamental of Digital Education, Education Technology such as features, natures, and characteristics.
- To gather information about the stakeholders of Education Technology specially Digital Education and to learn about the nomenclature available in this field.
- To know about the fundamental issues of Digital Education connected with the technology and other infrastructure and how they are lies with finance and economical matters.
- To learn and analyze of the issues and concern of the Digital Education and ICT in education such as social, emotional, and educational aspects.
- To get the information and issues of EdTech practices in the context of economics, and finance.
- To propose the possible way and support better EdTech practices including Digital Education systems.

METHODS ADOPTED

The research work 'Education Technology and E-Learning Sector in enhancing Knowledge Management Systems*: The Growth, Financial and Economical Concern in Indian Context'* is not only theoretical but also interdisciplinary in nature. And this scientific work was prepared after proper analysis of existing resources related to the EdTech and Digital Education. Here various knowledge material such as Research Journals, Popular Scientific Magazines, Books, other Edited Volume, Proceedings. Moreover research work related to this fields have been consulted like dissertation, projects and thesis using Shodganga of UGC on the topic Online Education, E-Learning, and Educational Technology, and finally the same has been reported in this work.

EDUCATION TECHNOLOGY, DIGITAL EDUCATION & GOVERNANCE

'Educational technology' is not only a practicing field but also a domain these days, it is the integration of Educational Sciences with the Information Technology. It is required for facilitating learning and also for improving performance. In creation of contents including the uses and management of technological systems Education Technology is highly required. Therefore for direct and indirect purpose of developing educational products, tools, and systems, etc. Educational Technology (or EdTech) is highly required. Educational technology is the systematic application in various educational activities which include the teaching and learning, research, development and instructions (Halili, 2019; Hanna, 1998; Wahabi, *et al.* 2019). Digital Education is another allied nomenclature which is required for the purpose of integrating these concepts, and also thoughts into practice. In Education Technology practice various sub-fields are highly important and practices and among these following are considered as important viz. (also Refer Fig. 2)—

- Software Systems and Technologies.
- Networking Systems and Technologies.
- Web Systems and Technologies.
- Database Systems and Technologies.
- Multimedia Systems and Technologies.
- Security Systems and Technologies, etc.

Following figure is helpful in identification of the concepts of Digital Education and its basic

composition technologies (Heller *et al.* 2008; Huang *et al.* 2019; Xu *et al.* 2019).

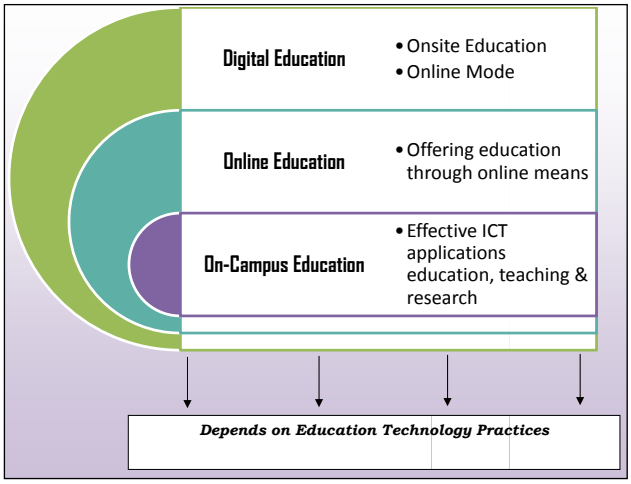

Fig. 2: Digital Education and allied areas powered by Education Technology

ED-TECH INDUSTRY IN INDIA: MOVE, GROWTH AND POTENTIAALS

The Education Technology industry developed significantly in last decade and very specifically in recent years and also treated as most important EdTech destination of the world. Many expert also explain that India is become Education Technology hub of the world as not only the private sector companies but also public sector institutions and universities played a leading role in designing and developing EdTech systems (Narciss, 2013; Miranda *et al.* 2021; Paul *et al.* 2018; Paul, 2022). This growth mostly made during the period of pandemic when E-Learning was only way to get knowledge and also spread the knowledge. Moreover there are certain benefits of E-Learning or ICT based Education. Many parents and students always interested in getting knowledge beyond boundaries and here is the goal of EdTech and Digital Education. Special tailored classes including proper access become easy and effective with EdTech implementation. In Digital Education specially in Online Education students are able in getting personalized learning and education and recommendation of their previous learning patterns. Since most of the digital platform allows previous or existing studies again therefore it is helpful for the students for their own satisfaction and also preparing for other educational purposes such as competitive exams etc. Study reveals that, seven percent success rate compare to one percent in traditional education (Hussin, 2018; Paul, 2023; Robin & McNeil, 2012).

Due to flexibility of Digital Education with this students can join anytime and anywhere learning and thus this is less rigid in regard to timetable and offers quality education as per need and requirement. In certain cases those who are working and at the same time getting education for them it is instrumental and beneficial in certain cases. Problem solving of the students become possible with Digital Education support and accessible high-quality education in certain cases over conventional education. As Digital Education i.e. Online Mode support national and international teachers, therefore it is allows student international education whenever needed and possible (Gibson *et al.* 2015; Keser & Semerci, 2019; Knox, 2016). This less geographical constrains helps in developing Education Systems more effective.

As far as better navigation is concerned various user interface systems, effective multimedia based systems and graphics are important in healthy and sophisticated educational experiences. India is a developing country and there are issues and concern in developing and managing infrastructure including the challenges and drawbacks. The aspect of Digital divide can be effectively managed by ensuring Digital Education. Poor accessibility and advertisement sometimes creating issues and challenges in EduTech practice. According to latest research organizations and market survey agency India has more than 4450 edtech startup companies which are directly and indirectly serving school children by offering education and this number may touch 300 million. Further about 40 million learners are avail the benefits of Online education or Digital Education using ICT during the period of Covid-19. During the Covid-19 period students and learners become habituated in education by ICT tools and it helps in developing personalized learning and in this context Education Technology companies from India slowly bridges the gap regarding Digital Divide. Many EdTech companies even started multicultural approaches since India is a diverse country. Learners outside of India are joining Indian educational institute due to nominal course fees and offering world-class content delivery. Even many Indian EdTech companies have started

their operations and services in other countries including collaborations with foreign universities and institutions. Such EdTech companies are doing international operation for accessing and availing international markets and to offer quality services (Dillenbourg, 2016; Paul *et al.* 2014; Qureshi *et al.* 2021). Many Indian EdTech companies are highly engaged in international operation and that is also fulfilling the role and aim of the National Education Policy-2020. As Government of India permits the foreign campuses to be established in India it also opening EdTech industry into a transforming system. Collaborations and partnership is to be helpful in offering outstanding learning environment and educational mechanism. Digital Education industry therefore is an important and effective way of knowledge dissemination and responsible for removing digital divide. Indian EdTech companies are engaging with advanced Information Technology practice for the healthy, sophisticated and advanced knowledge delivery systems.

Indian State Governments are also playing an important role in advancing Information and Communication Technology for complete educational process and development. According to the expert reports Indian Digital Education sector is categorized into school education, entrance test and coaching, online certification, skill development and as far as highest investment is concerned School education related support (i.e. K-12) from the EdTech industry is treated as most valuable with about 1.16 Billion USD as per 2020 and it is to be around 4.3 Billion USD within 2025. As a whole Indian Education Technology in the year 2020 was 2.8 US Billion USD and according to the major market research firm it may increased more than 10 USD billion within 2025. Here Table 1 is showing complete market size of Indian EdTech companies in the year 2020 and also expected in the year 2025 (as per india-briefing).

According to the experts Indian Education Technology companies are always giving their best in preparing and developing good, valuable and reliable contents and innovative solutions. Therefore in addition to the general face-to-face education the best of Digital Education can be extracted whenever and wherever required and this practice can lead the betterment and advancement of EdTech industry in India. The developed system of Indian EdTech companies are real example of good quality of Indian knowledge resources, pedagogy and operations to entire world (Miranda *et al.* 2021; Reeves, 2003; Salmon, 2019).

Table 1: Past market share and future market share of Education Technology industry in India

Segment	2020	2025 (Projection)
K-12	US$1.16 billion	US$4.3 billion
Test preparation	US$0.8 billion	US$3.99 billion
Online certification	US$0.58 billion	US$1.38 billion
Skill development	US$0.26 billion	US$0.73 billion
Total	**US$2.8 billion**	**US$10.4 billion**

Even the glorious presence of Indian companies deals with Digital Education/ EdTech in fortune 500 companies also considered and treated as impactful and valuable move and inspiration of other small companies and startups. It is worthy to note that Digital Education is about managing and operating education using ICT or in Online Platform or Blend of different methods. Indian Education Technology companies are using various techniques, system and procedure using various scale. Due to the Covid-19 today many companies have started into Digital Education sector and till continuing as a giant worldwide and symptoms already visible in some context. Indian EdTech industry is expected to reach 30 billion US Dollar within next decade as per major market research survey organizations. As per recent data PhysicsWallah (in short called PW) which offers education and training in online and ICT based systems entered into the unicorn club as it has raised its worth value 100 million USD, and as far as other major Digital Education service providers are concerned following are important which have entered (as per June, 2022) into the unicorn club viz.—

- Byju's
- Eruditus
- Unacademy Lead
- Upgrage and
- Vedantu

RBSA Advisor which is an important independent Transaction and financial Advisory firm also mentioned a report titled 'Unleshing EdTech Potential in India' and mentioned that new age

business models will increase the requirement of EdTech sector in India and it is to be more supported by the rules and regulations of the governmental policy and new Education policy of India called The New Education Policy-2020 will be more supportive in respect of higher and greater EdTech systems and promotion of Digital Education system. Indian Education Technology industry is growing rapidly and expanding not only in developing country rather it is now a favorite destination for other developed countries. The Covid-19 period give us a lesson regarding successful development of Digital Learning and Education and this boom started specifically in 2021 and some of the companies became brand such as upgrade, Vedantu and Eruditus and later Physics Walah also considered as important in billion dollar club. Various EdTech firms started various initiatives during difficult period of Covid-19 and important and effective as of now in other fashions such as in hybrid mode and blended mode in addition to the online mode and ICT in Education mode. Many Education Technology companies can be noted with substantial rise in Digital Education sector and this is specially increased in smartphone users and BARC India and Nielsen also reported that the increase rate was thirty percentage (Paul *et al.* 2012; Jena, 2015; Xu *et al.* 2019).

As far as data of 2021 is concerned BYJU's attracted market share in the field of Education Technology and total investment was 1.7 Billion USD whereas second position investment belongs to the Eruditus and here funding is about 650 million USD, and Unacademy also reached its investment at 440 million USD and upGrade got an investment of 185 million USD.

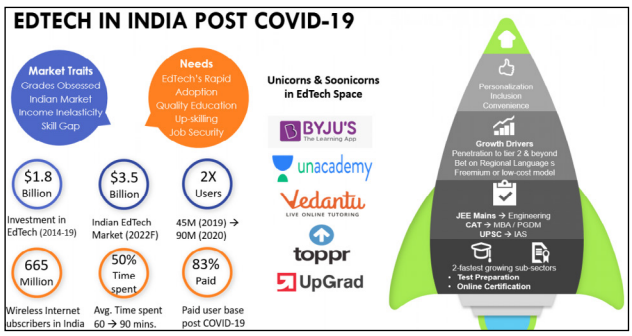

Fig. 3: Growth and some important stats of Indian Education Technology companies

Here Fig. 3 shows how the users between 2019 and 2020 became double and at the same time number of wireless subscriber in India along with their average time spending and some of the popular and ranked EdTech companies along with their logos (actual source: Casereads).

As far as a market report of Inc42 Plus is concerned India holds 346 EdTech funding dealing with 2020 first half from the year 2014 and this is a significant move and total amount of investment was US dollar 2.2 billion and interestingly among this amount about seventy nine percent categorized within online test and coaching centres belongs to the competitive exams while online certification shared 8.4 % and school education i.e. K12 shared 6%.

- As far test preparation EdTech companies are concerned some of the gained companies in the year 2020 was Doubtnut, Embibe, and Testbook.com;
- While Lido considered as most valuable and impactful in k-12 category;
- As far as online certification category is concerned Coding Ninjas treated as most vital;
- However, Classplus treated as important benchmaker in enterprise solution category.

Global Edtech companies are increasing rapidly and some of them are from India itself and some of the popular are Byju's, upGrade, Vedantu and so on. In the year 2021 itself EdTech market share increased at 800 million from 700 million 2021 i.e. 100 million USD growth (Edwards, 2015; Gibson *et al.* 2015).

EDUCATION TECHNOLOGY ISSUES IN INDIA & CONCERN RELATION TO THE FINANCE

Digital Education is increasing rapidly with its various forms all over the world and in India too apart from 'training organizations' recently coaching centers, and in tech support in face to face education to role of Education Technology is significant. Universities and colleges establishing new centres and departments to conduct Online Education or Blended Education, even uses of ICT in face to face education also been increased in recent past. Even apart from tremendous benefits Digital Education some concern and issues are important and alarming and some of them are analyzed in this section (also refer Fig: 4) and among the issues major are connected with finance and economical

in a country like India (Halili, 2019; Paul *et al.* 2023) and some of them are depicted in Fig. 4 here.

Fig. 4: Some of the issues in Digital Education specially for Online Education

Lack of Proper Electrification & Finance

Digital Education or Education Technology practice is fully depends on electronic devices which include laptops, servers, mobile and other smart electronic devices including Network devices viz. routher, switch, bridges, etc. and there are requirement of electrification in both the parties i.e. Digital Education service provider and service seeker. This issue is very common in rural India and thus for solving the economical issues and problems proper steps must be entertained. In this context joint initiative of Central Government ministries, state government and non government organizations and associations are highly required.

Infrastructural Problems & Economical Concern in Indian context

Building Digital Education needs proper infrastructure which including physical infrastructure and logical infrastructure required for the purpose of building the institution like rooms, libraries and laboratories and in a country like India there are huge problems in finance and funding and therefore it would be fine if proper funding is to be offered for building and developing physical infrastructure and also logical infrastructure including digital tools and products, purchasing technologies and systems including peripherals. In a developed countries such aspects are not issue and concern as they are with sufficient economical systems but India is a developing country issues like designing, developing, managing ICT in Education needs proper economical support and therefore solid requirement is highly appreciated (Paul *et al.* 2023; Jena, 2013).

Proper Funding in solving issues of *Digital Literacy*

Digital Education is the need of the hour and there are proper systems required for its proper and smooth running and among the issues, one of the important issue is Digital Literacy. Proper solving is possible with adequate organization of the events and awareness program; physically and online mode. Proper hardware literacy, software literacy, network literacy drive obviously required sufficient funding and economical input in respect of organization of these systems. Further, human resources are also required for organizing the events and developing online skill sets and altogether; these are based on sufficient funding (Paul *et al.* 2018; Paul *et al.* 2023).

Internet & Technological

Digital Education, if the sided on online or blended mode its required higher bandwidth, speed, and security including uninterrupted services for the purpose of smooth online education and ICT support in traditional educational. Though it is an alarming fact that due to the economic situation of India it is difficult to develop and operate the system. Apart from the traditional classes technologies need to organize and purchase for the conferences, workshops, and hands-on training, and in all the cases a proper all-round development of the installation and services are required and purely depends on better economical support. Here for proper technological changes of the tools and systems time to time funding and economical support is highly required.

Proper Economical Support to the EdTech Organizations

For developing Education Technology systems in the country proper and sufficient Educational Technology organization and companies are highly required. It is a fact that EdTech companies are dedicated in designing, developing, and maintaining Digital Education Systems and all these required proper funding and support in different context.

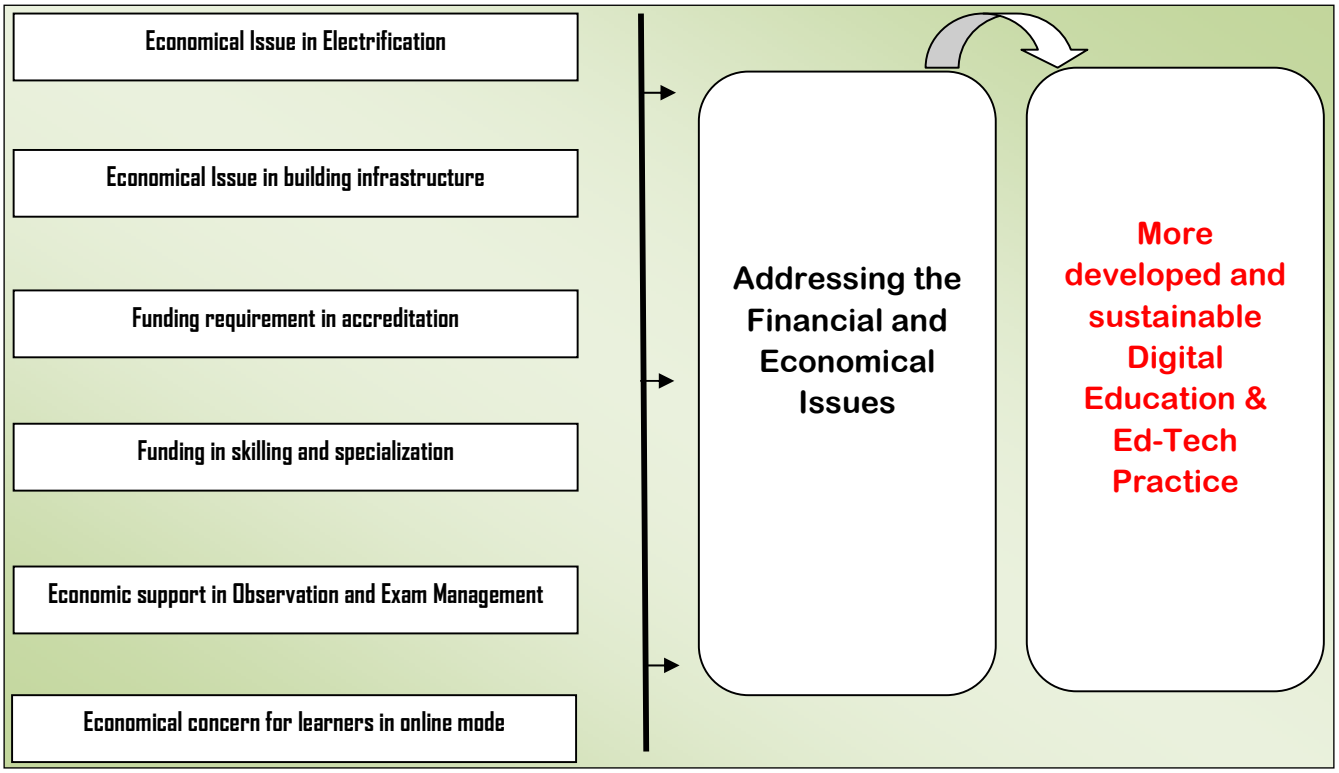

Fig. 5: Major financial and economical issues in Digital Education and EdTech practice in India

Course Structure and Economical Factors

Digital Education and Education Technology practice is highly depends on quality course ware and study material development and all these depends on proper finance and economical systems. In face-to-face supported by ICT, Online Education, and Blended Education all are truly depends on proper economical support and financial allocation including course structure, module development, unit development, etc. (Paul *et al.* 2023; Paul, 2023).

Program Accreditation, internationalization and funding

Digital Education and Education Technology practice gives us opportunity in availing degrees and diplomas in online mode but a great amount of standardization must be entertained while offering such degrees and apart from national accreditation proper internationalization is highly required in different sector and sense. Non-accredited degrees are to be invalid and worthless and thus sufficient funding must be entertained for such matters for the greater opportunities to the learners. Here proper funding and economical support initially may be given by the Government and allied organizations for a true online and ICT supported degrees.

Skilling, Specialization and proper funding

Digital Education and other supportive systems bring us quality ICT based education and Online Education. Digital Education is fully supported by the modern electronic systems and products and here proper skilling is important for offering the degrees online. As the age and time is changing including the trends, therefore skilling and specialization also must be changed accordingly and for this proper economical support is important from the parent institution, government, ministries and other associations (Edwards, 2015; Paul *et al.* 2023).

Continuous observation, Online Education and Economical Context

Digital Education is required proper and continuous observation to its tools, procedure and technologies involved. In a country like India most of the students are pursuing Educational program through the online systems and therefore tools and applications need to launch and start as per availability of electronic products. Moreover electronic products here runs all the contents in different platform and in this context proper look-after, observation to the physical resources and logical systems must be

entertained and this required qualified staff and electronic products to run smoothly. Here proper funding and financial support is highly required.

Exam Management and Funding

There are various concerns on Digital Education as far as Examination is concerned and it include the cheating and duplicating in online mode; however proper management from the educational institutions are important for fair examination process and all these requires good amount of fund. In a country like India arranging such amount may be difficult and it involves the requirement of different devices like *screen for sharing the information*, *uses of the hi-tech devices*, various *microphones*, *uses of Audio questions, etc.*

Tools for the Students and Economical and Financial Concern

In Digital Education systems, tools and devices not only required for the institutions or service providers but also for the learners in order to offer the educations and knowledge in various platforms, and in a country like India there are huge problems for such flexibility of the learners in purchasing of the products (Elboubekri, 2017; Paul *et al.* 2023). Government agencies, institutions, UGC and other appropriate bodies must need to think on this aspect properly.

CONCLUSION WITH FUTURE POTENTIAL

Today Education Technology sector is highly growing worldwide and India become a favorite destination of other countries for running and implementing online and digital education and at the same time Indian companies are also become popular in international market. Today India holds many iconic brands in Education Technology and Digital Education such as Byju's, Unacademy, Vedantu, Doubtnut, Embibe, and Testbook.com and it is expected to grow the industry more and expected to reach $10.4 billion within 2025 and as of now India itself hold 37 million paid Digital Education programs. Second and third-tier cities getting students in Digital Education and therefore Edtech industry become popular and important in such cities for online training, skill development, coaching and so on. The pandemic catalyzed online and digital education and due to lockdowns the edtech sector growing propensity through different online educational platforms and many universities are offering degrees and other programs online. Even Government of India also in planning to establishing new universities dedicated in Digital Education and existing universities also openup Digital Education Department. The financial issues considered as most important and drawback in Indian systems and it can be overcome by offering proper funding and financial support at the earliest. Joint support and initiatives are highly important and required in successful and sustainable development.

REFERENCES

Blikstein, P. 2013. Digital fabrication and 'making' in education: The democratization of invention." *FabLabs: Of Machines, Makers and Inventors*, **4**(1): 1-21.

Buchanan, R. 2011. Paradox, Promise and Public Pedagogy: Implications of the Federal Government's Digital Education Revolution. *Aus. J. of Teacher Edu.*, **36**(2): 67-78.

Dillenbourg, P. 2016. The evolution of research on digital education. *Int. J. of Artificial Intelligence in Edu.*, **26**(2): 544-560.

Dunleavy, G. Nikolaou, C. K., Nifakos, S., Atun, R., Law, G. C. Y. and Car, L.T. 2019. Mobile digital education for health professions: systematic review and meta-analysis by the Digital Health Education Collaboration. *J. of Med. Internet Res.*, **21**(2): 1-17.

Edwards, R. 2015. Software and the hidden curriculum in digital education". *Pedagogy, Culture & Society*, **23**(2): 265-279.

Elboubekri, A. 2017. The intercultural communicative competence and digital education: The case of Moroccan University students of English in Oujda. *J. of Educational Technol. Sys.*, **45**(4): 520-545.

Gibson, D., Ostashewski, N., Flintoff, K., Grant, S. and Knight, E. 2015. Digital badges in education". *Education and Information Technol.*, **20**(2): 403-410.

Halili, S.H. 2019. Technological advancements in education 4.0. *The Online J. of Distance Edu. and e-Learning*, **7**(1): 63-69.

Hanna, D.E. 1998. Higher education in an era of digital competition: Emerging organizational models". *J. of Asynchronous Learning Networks*, **2**(1): 66-95.

Heller, L., Parker, P.A., Youssef, A. and Miller, M.J. 2008. Interactive digital education aid in breast reconstruction". *Plastic and Reconstructive Surgery*, **122**(3): 717-724.

Hiltz, S.R. and Turoff, M. 2005. Education goes digital: The evolution of online learning and the revolution in higher education. *Communications of the ACM*, **48**(10): 59-64.

Huang, Z. *et al.* 2019. Digital health professions education on diabetes management: systematic review by the Digital Health Education Collaboration. *J. of Med. Internet Res.*, **21**(2).

Hussin, A.A. 2018. Education 4.0 made simple: Ideas for teaching. *Int. J. of Education and Literacy Stud.*, **6**(3): 92-98.

Keser, H. and Semerci, A. 2019. Technology trends, Education 4.0 and beyond. *Contemporary Educational Researches J.*, **9**(3): 39-49.

Knox, J. 2016. Posthumanism and the MOOC: opening the subject of digital education. *Studies in Philosophy and Edu.*, **35**(3): 305-320.

Narciss, S. 2013. Designing and evaluating tutoring feedback strategies for digital learning. *Digital Edu. Rev.*, **23**(2): 7-26.

Miranda, J. *et al.* 2021. The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering*, **93**: 107278.

Ozga, J. 2016. Trust in numbers? Digital education governance and the inspection process. *Eu. Edu. Res. J.*, **15**(1): 69-81.

Paul, P.K., Dangwal, K.L. and Garg, A.K. 2012. Education Technology and Sophisticated Knowledge Delivery. *Techno-Learn-Int. J. of Edu. Technol.*, **2**(2): 169-175.

Paul, P.K. *et al.* 2014. Education Technology: Emphasizing EduNxt Knowledge Transformation Systems of Sikkim Manipal University (SMU), Gangtok, Sikkim, India. *Int. J. of Embedded Syst. and Computer Engineering,* **4**(2): 109-113.

Paul, P.K., Bhuimali, A., Kalishankar, T., Aithal, P.S. and Rajesh, R. 2018. Digital Education and Learning: The Growing Trend in Academic and Business Spaces—An International Overview". *Int. J. on Recent Res. in Sci., Engineering & Technol.,* **6**(5)*:* 11-18.

Paul, P.K. 2022. Digital Education: The Aspects and Growth in Socio-Economic Development-Towards sophisticated Education 4.0 Practice. *Econ. Aff.*, **67**(5): 971-980.

Paul, P.K., Aithal, P.S., Sharma, S.K. and Saavedra, R. 2023. Infrastructure-Technology, Socio-Economical Issues and Challenges in ICT-based Education and Digital Education with Possible Solutions-A Scientific Observation. Latest Concern and Research in Applied Social Science, Management in Digital & ICT Society, pp. 1-16.

Paul, P.K. 2023. Digital Education: Its Uses and Perception among the Students of Raiganj University and Adjacent Institutions-The Social) Technological & Economical Context. *Econ. Aff.*, **68**(2): 1179-1192.

Qureshi, M.I., Khan, N., Raza, H., Imran, A. and Ismail, F. 2021. Digital Technologies in Education 4.0. Does it Enhance the Effectiveness of Learning? A Systematic Literature Review. *Int. J. of Interactive Mobile Technol.*, **15**(4): 31-46.

Reeves, T.C. 2003. Storms clouds on the digital education horizon. *J. of Computing in Higher Edu.*, **15**(1): 3-12.

Robin, B.R. and McNeil, S.G. 2012. What educators should know about teaching digital storytelling". *Digital Edu. Rev.*, **22**: 37-51

Salmon, G. 2019. May the fourth be with you: Creating Education 4.0. *J. of Learning for Develop.*, **6**(2): 95-115.

Jena, S.K. and Das, K.C. 2013. Management of Information and Knowledge Centres in Cloud Computing Environment: Opportunities and Challenges. *Int. J. of Appl. Sci. and Engineering*, **1**(1): 39-47.

Jena, S. K. 2013. Automation of Library & Information Centre Using RFID Smart Technology. *J. of Int. Academic Res. for Multidisciplinary,* **1**(7): 363-373.

Jena, S.K. 2015. Social Networking: An Overview. *Indian J. of Appl. Res.,* **5**(8): 102-105.

Wahabi, H.A. *et al.* 2019. Medical Doctors' Offline Computer-Assisted Digital Education: Systematic Review by the Digital Health Education Collaboration". *J. of Med. Internet Res.,* **21**(3): 1-14.

Xu, X., Posadzki, P.P., Lee, G.E., Car, J. and Smith, H.E. 2019. Digital education for health professions in the field of dermatology: a systematic review by Digital Health Education Collaboration. *Acta dermato-venereologica*, **99**(1&2): 133-138.