Role Of Disruptive Technologies In Qualitative Improvement Of Higher Education

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Abstract: India with its 1.31 billion populations boasts to own world’s third largest higher education system after United States of America and People’s Republic of China. On the other hand, the number of employable youth is all time high which is not only a grave concern for policy planners but also for the youngsters visiting higher education institutions to ensure their career.

An exploratory study was conducted to reveal possibility of using disruptive technologies in bettering the qualitative facet of higher education in India. A self-developed tool containing 20 close ended items with ‘Agree, and ‘Disagree’ options was prepared and duly standardized via valid procedures. The same was applied on a sample of 30 respondents comprising students and faculty members of three distinct universities of Delhi, NCR. The respondents were also provided with an opportunity to pen the most effective disruptive technology for higher education The data thus acquired was analysed upon percentile matrix and suggestions were listed objectively.

The study revealed that cent per cent students and 60% faculty members support the notion. 85% students and 70% professors agree that use of these technologies will enhance employability of higher education inmates. There is huge (90%) support among students on the issue of utility of innovative technologies in refocusing learners’ attention. Though only 60% faculty members are with the notion. Affordability of such technologies to masses is the weakest area where only 60% students and 40 per cent faculty members accept the motion.

Keywords: Disruptive technologies, Artificial Intelligence, Virtual Reality, Internet of things.
1. INTRODUCTION

“Education is the most powerful weapon you can use to change the world”, these words of Nelson Mandela, the first black president of South Africa and winner of Nobel Peace Prize in 1993 are apparent testimony of the importance of education in the life of an individual. Education is a liberating force which prepares an individual to become a useful member of family, asset to society and priceless resource for nation. The process of education helps to flourish the innate capabilities of an individual so that he attains the fullest development of his personality. In the words of Swami Vivekananda “Education is a process by which character is formed, strength of mind is increased, intellect is expounded and one can stand on his own feet”.

India’s place in the world literacy ranking is 106\textsuperscript{th} out of 127 countries as per the Global Education Report 2004 [1]. India’s Adult Literacy Rate which according the Human Development Report, 2009 was 66.0\% considered better than the world literacy rate i.e. 49.67\%. Yet it was far lower than several considerably poor countries including Burma, Jordan, Kenya, Libya, Sri lanka, Tanzania and Zambia. The data tells that India has the largest number of illiterates (34\%) in the world after China with 11\% of world illiterate population. This data is evident that even 73 years after the independence India is still passing through the Dark Ages in the areas of education and literacy.

The three industrial revolutions which triggered innovation, creativity, liberalization and globalization have given a new turn to the history of mankind. Education of course is not an exception. Anticipating the probable renovations in the structure and process of education in the new millennium; United Nations Educational Scientific and Cultural Organization (UNESCO) appointed the ‘International Commission on Education for the Twenty-first century’ in 1993. The commission was headed by Jacques Delors and eminent Indian academician Dr. Karan Singh was one of its fourteen members.

The commission in its report ‘Learning: The Treasure within’ [3] presented to UNESCO in 1996, mentioned that “In confronting the many challenges that the future holds in store, humankind sees in education an indispensable asset in its attempt to attain the ideals of peace, freedom and social justice”. Unquestionably, education is the very foundation of social transformation and development. The report also termed that “Education is a human right and an essential tool for achieving the goals of equality, development and peace”. Commenting upon the

2. REVIEW OF LITERATURE

Human evolution is the story of constant struggle for comfort, security and resource generation. There have been certain periods when these advancements have taken place rapidly and constantly. The first such phase came-up in 1765 and was known for massive mechanization, steam energy and industrialization. The second industrial revolution took place just a century later and was marked by novel sources of energy viz. oil, gas and electricity. Telephone, telegraph, automobile, airplane and rapid production machinery were pivotal in this phase. Another century later
electronic communication propelled by transistors, microprocessors and computers initiated the third industrial revolution. Nuclear energy, biotechnology and space research took a giant leap in this phase. Today, we are experiencing the fourth industrial revolution marked by digital and disruptive technologies which are diminishing boundaries among physical, digital and biological spheres. Soon we shall be in a virtual world where technologies will hold reigns of production, management and governance.

The fourth industrial revolution largely depends upon disruptive technologies which are so innovative and seamless that they are bound to expel the traditional ways of production, communication, business and even the educational systems. These technologies will be so superior that preexisting systems rapidly be swayed away. Such as the technologies of the previous revolutions outdated the traditional means of in all the three sectors of economy. The term disruptive innovation was coined by Clayton M. Christensen [4] in his work titled Innovator’s Dilemma. In this age of consumerism and rapid production, customary means of production will remain inadequate to meet targets. Hence, disruptive technologies have come-up as savior to cater the largest and the most demanding customers. All sectors of economy need to adopt them to sustain and propagate in the time to come. The distinctive features of disruptive technologies can be listed as under:

i. Disruptive technologies supersede the existing processes, products and means of production.

ii. These technologies possess superior attributes that immediately outstand preexisting systems.

iii. Such technologies are innovations rather than developments and are introduced by startups instead of customary companies.

iv. Disruptive technologies are difficult to prepare for because they can appear precipitously.

v. Traditionalism and inflexibility of existing systems raise need for disruptive technologies that allows disruptors to move upstream over time and cannibalize prominent customer segments.

Potential of Disruptive Technologies in Education
Education is the most ancient but inevitably up-to-the-minute profession on earth. It has always been instigator of innovation and creativity; the two engines of development and progression in all walks of life. Any revolution which has to subjugate society has to go through the process of education at some or the other level. At the moment, we notice smart boards, smart classes, e-books, online education, e-management of educational institutions practically taking place in the leading institutions at all levels. Now the time has approached to steer ahead and grab industry 4.0 into educational regime for qualitative upgradation and quantitative expansion of educational opportunities in the nation. The process has already begun but needs attention by stakeholders so that the same could be made operational for noticeable transformation of higher education.
Godwin Jones Robert [5] has indicated that Skype and podcasting have potential to democratize institutions. Once these technologies are available economically, it will ensure equalization of educational opportunities. Flavin Michael [6] in his paper titled ‘Disruptive technologies in higher education’ has quoted Christensen’s theory of Disruptive Innovation which mentions that these technologies are not designed explicitly to support learning and teaching in higher education, but have educational potential. The paper concludes that students and faculty members use technologies for learning teaching purposes informally, which is evident of the latent potential in disruptive technologies in bettering learning, understanding, skill development and application of theory into practice.

Frank Bryce McCuskey and Melanie Winters [7] generalize the concept of technological advancements in society and their transpiration in higher education institutions. The authors state that institutions of higher learning can never stay aloof from the socio-technological overhauling. The same is applicable with the digital revolution. The moment is not far when even the traditional institutions will be driven away by the new learning methodologies taking place in the leading universities across the globe. Enumerating the dividends of disruptive technologies in higher education institutions, the authors state that the list of its benefits are endless starting from equity and liberty to democracy and low cost quality education. Above all, it will free education from the boundaries of time, place and institutional restraints and make it a lifelong process. The Naman Vinod, in his work titled ‘Digital India’[8] drives a debate between idealists and pragmatists upon the structure, procedure and outcome of learning process as the futuristic institutions will completely lose their contemporary structure and procedure and will be more informal in their nature and functioning.

Grainne C, Maatnnde L, Teresa Dillon, Jonathan Darby [9] have found that most of the new generation learners are already living in a technology rich and technology enhanced learning environment where they readily serf for appropriate technologies to meet their specific learning needs. The paper titled Disruptive Technologies, Pedagogical Innovation: What’s new? Findings from an In-depth Study of Students’ Use and Perception of Technologiesuggests academic institutions to get designed, provide and popularize specific learning applications for their students to ensure effective, extensive and long lasting learning experiences. Commenting upon the scope of electronic management of educational institutions Shruti Kant [10] has elaborated upon the role of information and communication technologies in institutional management with reference to teacher education domain. It was found that e-management places distinguished outcome upon qualitative betterment of teacher education. The study concludes that novel technologies put positive outputs and delivers quality learning among students.

The publication of institutional strategies for learning, teaching and assessment in UK higher education is practically ubiquitous. Strategies for technology-enhanced learning are also widespread. This article examines 44 publically available UK university strategies for
technology-enhanced learning, aiming to assess the extent to which institutional strategies engage with and accommodate innovation in technology-enhanced learning. The article uses qualitative content analysis as its method, and uses the categories of disruptive innovation, sustaining innovation and efficiency innovation to evaluate individual institutional strategies. The article argues that sustaining innovation and efficiency innovation are more commonplace in the strategies than disruptive innovation, a position which is misaligned with the technology practices of students and lecturers.

The publication of strategies for learning, teaching and assessment in higher education is practically ubiquitous. The Universities and Colleges Information Systems Association (UCISA 2016) states, ‘Institutional strategies continue to influence TEL [technology-enhanced learning] development, with Teaching, Learning and Assessment consolidating its position as the leading internal strategy cited by respondents’ (p. 11); their research was based on a sample of 110 UK higher education institutions (HEIs).

Ahmed A. Al-Imarah and Robin Shields [12] (2019) The potential influence of Massive Open Online Courses (MOOCs) on higher education institutions is much discussed and debated, with some arguing that MOOCs are a disruptive innovation that will radically change existing models of higher education. However, analyses of whether and how MOOCs might disrupt higher education models are relatively scarce. This paper analyses whether MOOCs should be considered a disruptive innovation according to the concept’s defining criteria. It compares characteristics of disruptive innovation with current developments in MOOCs, suggesting three perspectives – performance, benefits, and market – that can be used as a lens and analytic framework to explore and evaluate current practice. The findings indicate that MOOCs do not match all the characteristics of disruptive innovation as they are commonly identified in the literature. However, MOOCs may be a sustaining innovation that establishes new markets for learners who are not served by universities.

3. RESEARCH OBJECTIVES FOR THE PROPOSED STUDY

Education is core to the process of development and advancement ultimately turns in the progression of humanity as a whole. It is therefore, education must imbibe progressive approach to keep itself abreast with the technological developments so that their benefits could be percolated down to the masses. Hence, the present research study aims at achievement of the following objectives:

- To explore possibility of using disruptive technologies in higher education.
- To analyze impact of disruptive technologies in enhancing employability.
- To evaluate role of novel technologies upon refocusing learner’s attention.
- To assess affordability of the technologies from common user’ viewpoint.
- To enlist the most appropriate technologies for revamping higher education.
A. RESEARCH APPROACH
Considering exploratory nature of the study, a self-developed tool viz. questionnaire duly standardized via reliability and validity procedures was administered upon randomly selected 30 students and faculty members of Amity University, Uttar Pradesh, Noida GGSIPU, New Delhi and Gautam Buddha University, Greater Noida. The questionnaire carried 20 close ended items with ‘Agree’ and ‘Disagree’ matrix. The tool also provided space for writing the most viable disruptive technology in the respondent’s view which would be instrumental in qualitative improvement in higher education in the existing scenario. The acquired data was analyzed on percentile scale and results were discussed as per the objectives of the study.

4. DELIMITATIONS
Keeping in view the limited time and resources the sample was confined to the students and faculty members 5 each from three universities of Delhi, NCR. The questionnaire carried just 20 close ended items which were centered around the objectives of the research study. The tool provided space only for one disruptive technology which would be the most appropriate in the view of the respondent for qualitative improvement of higher education. The data was calculated on percentile scale which is one of the primal methods of analysis.

5. DATA ANALYSIS
The data for the study reveals eye opening facts which need to be kept before while educational planning and management in the institutions of higher learning. The outcome of data analysis has been depicted as tables to give a flashing look to the readers. The data has been analyzed as per the objectives of the study:

Figure 1: Exploring possibility of using disruptive technology in higher education.

It is obvious from the data that cent percent students believe in possibility of using disruptive technologies in higher education institutions for qualitative improvement in learning outcome. On the other hand, faculty members seem to be little suspicious on the issue. Though a considerable majority i.e. 60% professors opine in favor of the motion. The reason for such unbelief may be sough through further study.
On the question of enhancement of employability skills in learners by the use of disruptive technologies the opinion of both the sections of respondents are closely consented. 85% students feel that such technologies will have positive correlation with job confirmation. Whereas, the faculty members are comparatively suspicious upon the issue, though 70 percent among them believe in the notion. Hence, it may be derived that there is a good percentage of respondents who see employment enhancement capability in use of disruptive technologies in higher education.

Deviation in learner’s attention is global concern as far as higher education is concerned. Looking at the craze of gazettes among youngsters, it was intended to get respondents’ view upon the issue. The data thus acquired is formal testimony to the assumption wherein 90% students agree with the notion. On the other hand, faculty members as expected are not equally convinced and only 60% of them favor the proposal. The presumption behind the result pave way for another study to find valid causes therefor.

Figure 4: Assessing affordability of the technologies from common user’s viewpoint.
Affordability is a major issue for any technology to be adopted by the masses for upward mobility. Both sections of respondents viz. students and faculty members are more or less suspicious on the issue. The students, who are ardent supporters of using disruptive technologies in higher education, are just 60% with the motion. Faculty members seem to be dissident on the issue and merely 40 percent of them expressed their agreement on the issue. Therefore, it may be concluded that there is vast dissidence among the respondents upon the affordability of disruptive technologies for the learners of higher education.

**Enumeration of disruptive technologies suitable for higher education:**

The final objective of the study was to enumerate the most appropriate technology for revamping higher education. Most of the respondents have named popular means of social media viz. Facebook, WhatsApp, Twitter, Instagram, YouTube, Quora and so on, which were not counted among disruptive techniques suitable for qualitative uplift of higher education. But considerable number of respondents named significant technologies which are listed hereunder:

- Artificial intelligence
- Augmented reality
- Internet of things
- Robotics
- Natural Language Processing
- Visualization
- Self-writing software
- Cognitive prosthetics

6. **CONCLUSION**

Use of disruptive technologies in higher education is considered to be an alluring concept specially from the qualitative improvement viewpoint. There have been several studies to find authentication of this notion. A brief account of such studies has been presented in the paper which confirms the scope of applying such technologies at various stages of education.
Students and faculty members are key stakeholders of using disruptive technologies. Therefore, the study endeavored to get their opinion on the issue through a valid tool. The outcome shows that there is huge optimism upon the issue. All the students and 60% professors supported the use of disruptive technologies in higher education. 85% students and 70% professors agreed that these technologies will enhance employability of higher education inmates. 90% students approved that innovative technologies will be helpful in refocusing learners’ attention. Though only 60% faculty members supported the notion. Affordability of such technologies was supported by 60% students and 40 percent faculty members. Artificial intelligence, Augmented reality, Internet of things, Robotics, Natural Language Processing, Visualization, Self-writing software and Cognitive prosthetics were the leading technologies enlisted by the respondents for qualitative upgradation of higher education.

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