Conceptual framework on Smart Learning Environment for the present and new century- An Indian perspective

Marco conceptual sobre el entorno de aprendizaje inteligente para el presente y nuevo siglo- Una perspectiva india

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Abstract: Learning environments have changed significantly in the past few decades due to the inclusion of emerging Information and Communication Technology (ICT), both in hardware and software, as well as various online media in classrooms. Learners today utilize mobile gadgets and applications as their primary sources of information, knowledge, and social discourse. However, despite these advances in learning all technologies and the way learners have adapted to their changing environments, Technology is often used to supplement, rather than drive, the learning environment. Smart learning involves the emerging notion of smart technology. Incorporating smart learning techniques into classroom teaching seems very interesting and constitutes complete knowledge pack. Further it is interesting to see what is being done, what issues are emerging, and what successes possible in the concerned areas that likely to occur in the next few years. In responding, this conceptual paper seeks to identify learning elements and approaches that might lead to stable, coherent and exhaustive understanding of smart learning environments, thereby providing standards development for learning, education.

Keywords: Smart Learning Environment, Education, India.

Abbreviations

ICT: Information and Communication Technologies; MHRD: Ministry of Human Resource Development; UGC: University Grant Commission; AICTE: All India Council of Technical Education; IUC: Inter University Centres; INFLIBNET: Information and Library network; CEC: Consortium for educational communication; IoT: Internet of Things

1. Introduction

Many scholars have been witnessing for technology implementation and innovation practices in their research studies. What are smart learning environments? The idea of smart learning environments fits in the tradition of adding the adjective 'smart' to various existing phenomena, such as smart phones, smart tv's, smart boards, smart lights and smart cities in order to identify a next step in its development or a new generation. So, from this perspective smart learning environments could be seen as learning environments that are considerably improved to promote better and faster learning (KOPER, 2014).

Smart learning offers a paradigm shift in the way students' access learning. It is not just the change in the delivery of learning but much more than expected. With thorough changes in technology, the teachers of today can have a hard time processing what the future will be like 20 years from now. Smart learning solves this challenge by using state-of-the-art technology helping both learners and teachers prepare themselves for tomorrow.

A smart learning can be done in a virtual or physical environment. It could also be a blended version of both. Smart learning can also be summarised as the use of smart devices to augment the learning outcome of traditional learning. By using advanced learning methods such as online virtual classrooms, virtual learning environment, cloud servers, smart phones etc. a teacher can help students gain more out of their learning.

Smart learning aims at providing holistic learning to students using modern technology to fully prepare them for a fast-changing world where adaptability is crucial. It hones them with the skills needed for a digital future that will have newer ways of living and working.

Teachers also need to adapt to the modern skills like analytics and assessment methods and learn how to apply them in their traditional classrooms with the use of information technology.

Modern age learning environment allows students to collaborate with others through various platforms such as partake in online discussions threads to solve their queries, take up Massive Open Online Courses (MOOC) from the renowned and best universities round the globe. They may also self assess whether they meet the global standards within their domain or not (https://yourstory.com/2018/05/smart-learning-advanced-learning).

Smart learning environment enhance learning styles and students' motivation behind the learning. It also helps learners to craft better teaching styles that fit as per the students need.

According to the research report "Smart Learning Market by components (Hardware, software, integrated solutions and standalone solutions, and services (Learning types; synchronous learning and Asynchronous learning), End user (Academic and Enterprises), and Region-Global forecast to 2024" published by markets and markets. The smart learning markets projected to grow from USD 23.2 Billion in 2019 to USD 56.5 Billion in 2024 at a compound annual growth rate (CAGR) 19.5 percent for the forecasted period.

The major factors driving the growth of this proliferation of the connected devices in the education sector, adoption of E- Learning solutions and growing need of Artificial intelligence (AI) and Machine Learning (ML) in smart learning (https://www.marketsandmarkets.com/PressReleases/smart-digital-education.asp).

Learning environments have changed dramatically in last many years through information and communication technology. From the introduction of personal computing and the internet there has been a continuing explosion of innovations in support of learning and instructions.

India has the second highest number of Internet users (390 million) globally but with substantial room for growth. India expects another 500 million users to come online over the next decade, which presents immense opportunity for smart learning product providers to tap. Many of these users will be in tier II, III towns and rural areas where the penetration of formal education is still low. Information and communication technologies have made a major impact on education.

Rural vs. urban: rural penetration much lower than urban

Internet penetration by rural vs. urban (2017)
(%)
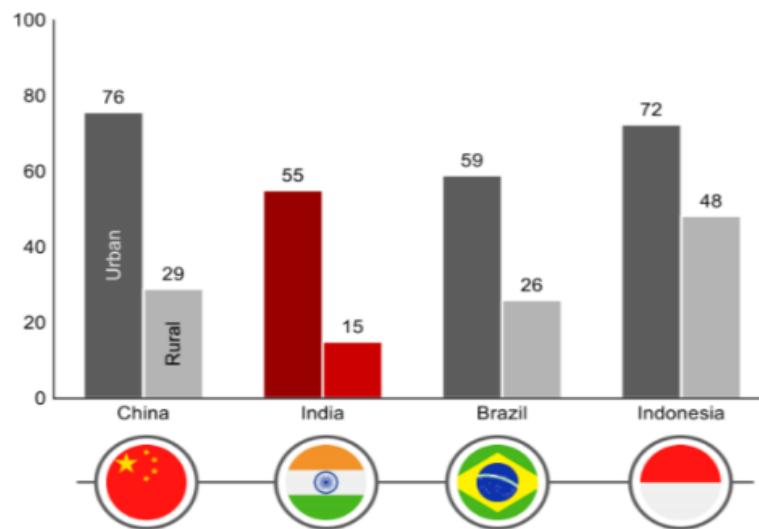
Our research for smart education highlights multiple value addition that IoT (Internet of Things) and related technologies can offer for education sector covering all modes of learning from classroom to virtual and from academic to sports. Use cases such as smart boards, student attendance systems, student and staff safety and tracking, crowd and emergency management have already seen good uptake in India.

And innovative solutions using IoT such as smart chair, connected sports equipment, athlete performance tracking, smart wearable, simulation using augmented reality and others show a lot of promise but at same time are not affordable, scalable, and readily available in the Indian market ecosystem. In recent years the use of new technologies in educational systems has increased worldwide as digital cameras, personal computers, scanners, and easy-to-use software have become available to educators to harness the digital world.

The impact of new technologies in educational contexts has been mostly positive as new technologies have given educators the opportunity to enhance their knowledge, skills, and therefore enhance the standard of education (SMEDA ET AL. 2014). Countries like India which is undergoing rapid growth in their educational efforts. Will Information and Communication Technologies create a revolution in the education sector? What can we expect in the way of impact due to the spread of access to the Internet? Will Internet access over the mobile phone make rapid advances possible in rural areas? What evidence is available to judge popular claims and predictions regarding dramatic growth of Internet usage as a result of the

widespread use of cell phones? Can we identify the hampering factors that limit progress in using technology for education? Every major development in technology triggers hopes in developing countries in regard to its potential impact on education.

2. Review of Literature

In this section several research topics which support the Educational institutes have gone beyond the traditional way of learning by accepting the latest technologies and modern trends, making learning more innovative. The interactive technologies and Instant communication services have transformed the methods adopted for education into a more interactive, visualizable and accessible means. Education institutes in India, are in a process of adopting innovative techniques for creating a smart learning environment to nurture young talent (RAHMAN, HIMANSHI, DEEP AND RAHMAN, 2016).

The construction of learning environment is the foundation of teaching and learning. The concept of smart learning environment which is the high level of digital environment and clean support "easy, engaged and effective" learning (HUANG AND YANG, 2012). The current practices of e-Learning face challenges, isolation of learners from learning process, and shortage of learning process (OUF, ELLATIF, SALAMA & HELMY, 2017). Technology plays an important role in the learning process as it allows learners to become better aware of their level of understanding and comprehension. It allows teachers to provide feedback to learners to enable correction of learning strategies.

However, learning is based upon learner activities outside a computer-based learning environment is a challenging task. Matching with students' learning style has been shown to benefit students by improving their learning outcome, increasing satisfaction, and reducing the time needed to learn. Consequently, an accurate method for identifying these learning styles is of a high importance (BERNARD, CHANG, POPESCU AND GRAF, 2016).

It is further observed that the endeavor to renovate the current technology oriented learning environment by establishing a Smart Classroom 2.0 (SC 2.0) using innovative information and communication technology and by utilizing mobile-assisted technology in technology oriented learning. Study revealed that having experienced both systems, students, in particular, showed significant improvements in how they viewed learning with the use of ICT. Students' self-perceived learning motivation and effectiveness have improved significantly. In addition to the

use of innovative ICT in science learning environment, the university has further extended its efforts to utilize mobile devices into pre-service teacher education (CHANG, CHEN AND CHANG, 2016).

Smart learning is the learning activity which can enable high learning experiences, high content suitability, and high learning efficient. The research on smart learning and smart learning environment (SLE) is just at the very beginning. There has not been a mature research framework on smart learning. SLE is an open-ended, intelligent, and integrated learning space based theoretically on constructivist learning theory, blended learning theory, and modern education methods, which is composed of the corresponding devices, tools, techniques, media, teaching resources, teacher communities, and learner COMMUNITIES (LIU X., HUANG R., CHANG TW. 2016). Biber S.K., Reis Z.A. (2016) investigated further on web based teaching method on students' creativity, supported by smart learning environment compatible activities which were designed to improve students' creative thinking abilities. In his research the author has chosen two classes by randomization method. Traditional teaching methods and technology is used in one of the classes while in the other class web based teaching method was applied. Apart from that social networks also contributing in improving the learning environment into smart learning platforms. Popescu (2016) revealed that Blogs are increasingly popular Web 2.0 tools in educational settings, being successfully used both for individual and collaborative learning.

This study explores the use of blogs as communication and collaboration tools in project-based learning settings. Overall findings confirm blogs' affordances for educational settings, and in particular for project-based learning scenarios, fostering collaborative knowledge construction, and boosting student satisfaction. Although "flipped classroom," as a new teaching model, has attracted the attention of many researchers at home and abroad, very few researches have focused on the teacher–student interaction in flipped classroom (ZHANG AND WU. 2016).

MOOCs (Massive Open Online Course) are also becoming a way of responding to the actual trends in education and learning: increase in the use of online learning, delivery of shorter courses, creation of new awarding schemes, and increase of partnership in building new curricula. There are many teaching opportunities and instructional challenges seems on integrating OER and MOOCs in technical higher education (ANDONE AND VASIU, 2016).

The improvement of the smart university model, defined as a set of highly technical interrelated elements, by implementing a social learning platform within the university ecology. This platform should permit the collaboration of various stakeholders – students, professors, university representatives and companies and should increase the visibility of the most meritorious graduates (DASCALU, BODEA , MOLDOVEANU AND DRAGOI ,2017).

Some studies found that complex knowledge can be learned more effectively when students are engaged in a collaborative classroom environment. Therefore, conventional classroom learning should be redesigned into collaborative learning activities and study how students interact. In this study, Laurillard's conversational framework was used to redesign collaborative university classroom environment which centered at developing a multimedia project (LEOW AND NEO, 2015).

A smart learning environment (SLE) is characterized by the key provision of personalized learning experiences. Smart learning could mean customized learning that optimizes learning pathways, engages learners in positive interactions and guides instruction in a goal-oriented fashion. While the why (optimal learning through customization), where (ubiquitous learning interactions), and how (technologies for goal-oriented learning) of smart learning environments are rather obvious at a coarser level, the degree of customization, the scalability of ubiquity, and the integration of learning-related data are still key challenges facing educational technologists. Smart learning environments encompass traditional classrooms as well as online and distance education (BOULANGER, SEANOSKY, KUMAR, KINSHUK, PANNEERSELVAM , THAMARAI SELVI SOMASUNDARAM (2015).

3. Technology in Education

Information and Communication Technology (ICT) is becoming a fast changing and renewing technology for higher education industry. With the advancement of ICT tools and techniques, social media evolved as a prominent communications tool and found to be a facilitating tool for teaching and learning, particularly in the higher education.

Thus, academic institutions and faculty are under pressure to use the social networking sites, such as Facebook and LinkedIn, to connect with students and to deliver instructional content. This has led to a rise in stress among academicians for efficient and effective use of social

media and other ICT based tools for collaborative learning (JENA, 2015) India with a population of more than 1.32 Billion, India is second populous country in the world.

Apart from such huge population in the country India has also large number of institutions for formal and informal education. According to the latest report on All India Survey on higher education there are 799 Universities, 39,701 colleges and 11,923 standalone institutions in India. As per the Ministry of Human Resource Development (MHRD) data 2011- 2012, there are 1.3 million schools in India and probably even more now.
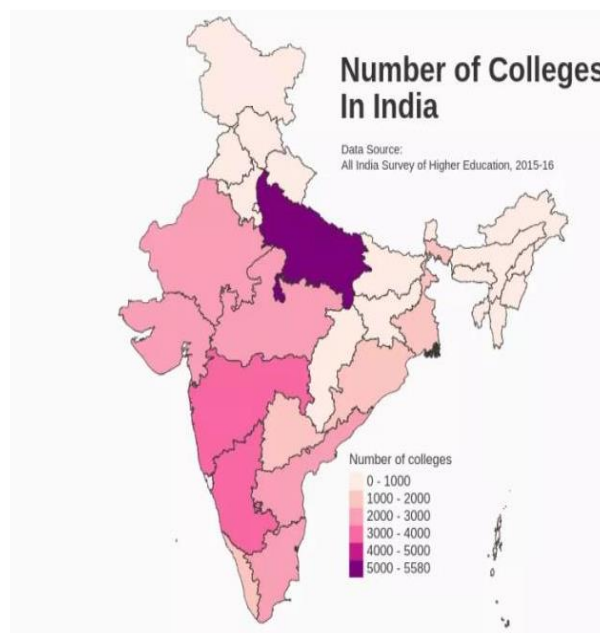
Source: All India Survey of Higher Education, 2015-16

Even with such a large number of institutions, literacy rate of India is only 64% only which open the doors of further improvement and that is possible by incorporating the ICT in education. As India consists of about 17.4% population of the world, it is one of the most widespread and most attractive markets for smart education.

Smart Education:

Smart education, a concept that describes learning in digital age, has gained increased attention. The smart pedagogy framework includes class-based differentiated instruction, group-based collaborative learning, individual-based personalized learning and mass-based generative learning. Furthermore, a technological architecture of smart education, which emphasizes the role of smart, computing (ZHU, YU, & RIEZEBOS, 2016).

It is a set of technology-based solutions, which force sensor networks, cloud computing, artificial intelligence, augmented reality, internet and other smart technologies combined with engineering excellence to enhance the learning of the subject (SOLANKI. V; SHARMA.A; SRINIVAS RAO. V; KAUL. R; DOSHI.D; GUPTA.V; CHERUVATOOR. JOY, 2018). Smart education covers the learning modes, activities, pedagogy practices within the university or colleges or special research projects.

Smart Classrooms:

Smart classrooms are typical ecosystem for smart learning. Technology playing pivotal role in the students' learning. In today competitive world students needs the skill sets which are beyond the subject knowledge. Various online software, E-Tutorials, E-Learning Models, online video classes, chatting, multimedia lessons, educational videos, online training, online multi-way communications, online classes are some of the common available methods of education delivery and becoming affordable due to the enhancement in the speed of internet and competitive prices of many internet providers or startups in the country. E-Revolution of technology brings the concept of E-Class or Smart Class in the education domain.

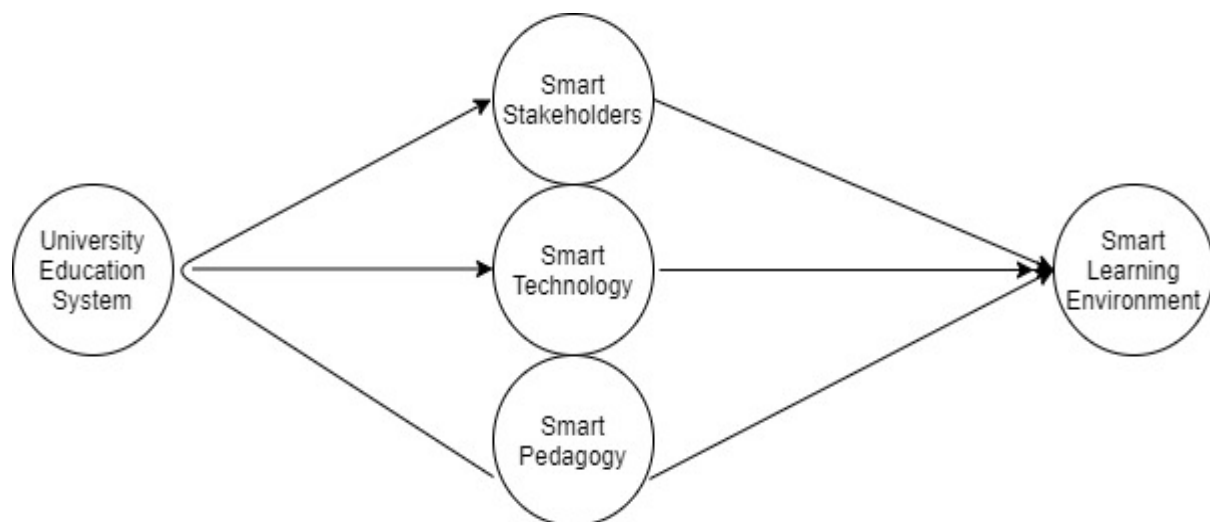**Proposed Conceptual Framework Elements**

Figure 1. Conceptual Framework

Figure 1: Show the conceptual framework for this study which consists of various elements that supports the smart learning environment in academia.

4. Conceptual Framework Elements

There are some key elements in the study such as smart stakeholders, smart technology and smart pedagogy which are the mediators between university education system in India and smart learning environment.

- *University Education System:*

Indian Colleges and universities are facing major changes as they navigate the 21scentury and make decisions that will not only impact higher education but will also contribute to our country's future competitiveness in the global marketplace. India is rapidly changing country in which inclusive, high quality education system is of utmost important for its future prosperity. Higher education system plays an important role for the country's overall development which includes industrial, social, economic etc. Indian higher education system is third largest in the world.

The role of Indian higher educational institutes such as colleges and universities in the present time is to provide quality based education in the field of education, research etc to empower youth for self sustainability (SHARMA AND SHARMA, 2015). Framework of higher education in India is very complex. It includes various type of institutions like universities, colleges, institutes of national importance, polytechnics etc.

Universities are also of different types like central universities which are formed by government of India, by an act of parliament which are responsible for arranging and distributing resources required by university grant commission (UGC), State universities, Deemed universities (aided and unaided) and Private 1 Sharma and Sharma: Indian Higher Education System: Challenges And Suggestions Published by CORE Scholar, 2015 universities (KAUL, 2006). University education system keeps on changing as per the global education system and initiatives.

- *Smart Stakeholders*

21st century has given impetus to the exponential growth of smart learning. It fosters engaging personalized learning where stakeholders can optimized their understanding about contribution to smart learning environment. Due to the ubiquitous revolution of

borderless education, smart learning is now considered as a knowledge-centric catalyst in supporting personalized and collaborative learning in the education domain. Stakeholders comprise of students, teachers and administrators primarily which directly and indirectly relates to smart learning and employment competitiveness. Stakeholders are now prone to techno savvy approaches in future on various aspects.
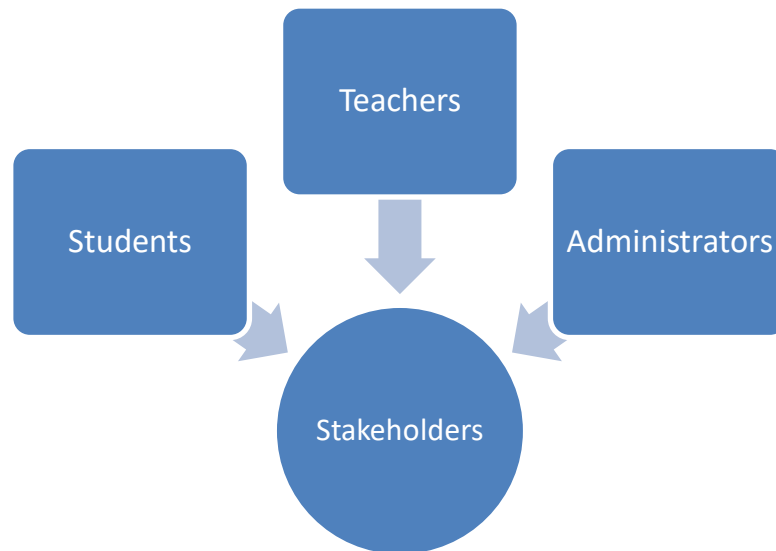
Figure 2: Stakeholders component

Encourage students to be proactively associated with new technology to support the online Learning process, make them available anytime, anywhere and In addition, it allows students to help them get the information they need in learning, especially in developed countries. By changing traditional learning to smart learning, Teachers and supervisors provide effective education, access to the world of E-education, and allow students. Academic institutions provide required support system by helping, managing and implementing E learning opportunities and facilities for advance and smart learning. All the stakeholders are key associates that have significant influence on the success of learning environment.

- *Smart Technology:*

The greatness of any country largely depends upon the education system of any country that is used to nurture its talent inside. The development of new technologies enables learners to learn more effectively, efficiently, flexibly and comfortably. Learners utilize smart devices to access digital resources through wireless network and to immerse in

both personalized and seamless learning. Smart education, a concept that describes learning in digital age, has gained increased attention (ZHU, YU, & RIEZEBOS, 2016). World is rapidly changing into a global village. While trying to remodel and upgrade the education system, a key issue is that of quality of education processes in the country.

Needs and expectations of the society are changing very fast and the quality of higher education requires to be sustained at the desired level. The use of internet for educational purposes has increased many folds among Indian youths. Online video lectures and e-books are the emerging trends among learners (KUMAR, 2011; CHAUDHARY, AGRAWAL & JHARIA, 2014; RAHMAN, DEEP, & RAHMAN, 2016). Many public and private universities have started promoting and motivating students to download their mobile apps and software for ease of learning and improved technological skills. These university apps allows students to access their routine learning tasks, lecture notes or material and timely information about their career guidance and opportunities in future.

5. Smart Pedagogy

Pedagogy has been defined as the discipline that theoretical concepts and practical approaches (Lorenzo and Gallon, 2019). Various innovative learning strategies including (1) Learning by doing, (2) Flipped classroom, (3) Game based learning, (4) Adaptive learning , (5) Context based learning, (6) Collaborative learning, (7) Learning analytics, (8) BYOD (Bring Your Own Device strategy, (9) Personal enquiry based learning, (10) Crossover based learning, (11) Learning through social media, (12) Robotics based learning and many other technology based approaches to learning and teaching. These innovative technology-based learning and teaching strategies for smart classrooms clearly shows that in the near future smart pedagogy will be actively deployed by leading academic institutions in the world for teaching of local and remote students in one class (USKOV, BAKKEN, PENUMATSA, HEINEMANN, RACHAKONDA, 2018; GRADEL & EDSON, 2010; KARKAZIS P. ET AL. 2019).

- *Govt. Initiatives on eLearning***:**

There are several ICT initiatives MHRD (Ministry of Human Resource Development) in collaboration with UGC (University Grant Commission), AICTE (All India Council of Technical Education, Inter University Centres (IUC), information and library network (INFLIBNET), Consortium for educational communication (CEC) in the form

of digital platforms which is accessible by students, teachers, researchers in university and colleges. Followings are the list of few initiatives taken so far:

➢ -SWAYAM online courses: provides access to best teacher learning resources. http://storage.googleapis.com/uniquecourses/online.html

➢ MOOCs: Provides access for not technical and UG course learning material. http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php

➢ e content: This platform for 87 under graduate courses learning material.

http://cec.nic.in/cec/

➢ SWAYAMPRABHA: This platform has around 32 DTH channels provides high quality curriculum based course content covering diverse disciplines such as arts, management, science, commerce, performing arts, social science, humanities, engineering, architecture, technology, medicine, law etc to all teachers, students across the country and these channels are free to air.

https://swayamprabha.gov.in/

➢ CEC-UGC YouTube Channel: Provides unlimited access to the curriculum based video lectures. https://www.youtube.com/user/cecedusat

➢ National Digital Library: This is a digital repository with vast amount of academic content in different formats and provides interface for specially able students as well. https://ndl.iitkgp.ac.in/

➢ Shodhganga: This is also digital repository and provides access to 2,60,000 Indian electronic thesis and dissertations for research purpose and make it available for entire research community. https://ndl.iitkgp.ac.in/

➢ e-Shodh Sindhu: Provides current as well archival access to more than 15 crore peer reviewed journals and bibliographic, citations and factual database in different disciplines from a large number of publishers and aggregators. https://ess.inflibnet.ac.in/

> ➢ Vidwan: This platform is a database of experts which provides information to peer and prospective collaborators, funding agencies, research scholars in the country. Faculty members are advised to register on this portal to help expand the exert database. https://vidwan.inflibnet.ac.in/

Finally it is summarized that above all are the initiatives been taken for excellent learning experience in the way to smart learning on various subjects and disciplines which covers a broad image of learning space.

6. Conclusion

Since the main purpose of this research was to identify learning elements and approaches that might lead to stable, coherent and exhaustive understanding of smart learning environments in university education in Indian perspective and thereby providing standards development for learning, education.

This research focused on how university education system can be shifted from traditional approaches to smart learning environment by adopting smart technology, smart pedagogy in learning. Further, Stakeholder's consideration and administrator planning on the smart learning environment in Indian university education may provide manifold uplift of education system in terms of better learning and quality academic inputs. The higher education sector in India witnessed a drastic change due to advanced technology including computers and smart phones.

As results, higher education will need to establish a strong foundation aided by information and communication technology that can extend learning opportunities in smarter way. Indian public and private universities taking leap to strengthen their learning environment through investment into information and communication technology. MHRD (Ministry of Human Resource Development) in collaboration with UGC (University Grant Commission) and AICTE (All India Council of Technical Education) always promote to shift to online learning which is more accessible and approachable for the students.

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