



**THE IMPACT OF DIGITIZATION & INNOVATION OF SMART EDUCATION –
ANALYTICAL STUDY OF ABUNDANT LEARNING TECHNIQUES**

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Abstract

Digitization is a new innovation in recent trends which have been interconnected with various objects with human life. Paper describes potential aspects of digitization in the education. The utilization and importance of Smart learning facility. It has been seen as still encountering difficulties in the utilization and benefits of technology in the education area. The researcher specified case studies in various sectors of education. The way of change the education using innovated Technology.

Keywords: Smart Education, Filled Classroom, Smart Campus, Enhanced Technology

INTRODUCTION

The current era there is a need for digitization of the Education part for developing and innovation of organization. The flow of learning facility used from traditional to smart learning. The utilization of Internet of Things Technology it becomes more helpful for entirely members of education field which is useful in use as anywhere, anytime, anyplace. This technological enhancement seen an impact on various features in the education. IOT has allowed to innovation of different real time applications. IOT has a highly improves quality of life by enabling various applications.

The Smart IOT system of education has worked on multiple areas in the institutes. These areas have made the process easier in terms of services of education, learning and teaching, security and safety. In this way the learning, teaching and administration services of the institutes, which helps to improve development activities of the education.

Smart campuses use different areas of education like digital learning, digital Classroom, Smart rooms these are information related to the classroom. The changing era of education by the existing system of education Smart campuses using IOT impacted on quality of education such as like smart cities, home machines, fitness, environment maintains, transportation, smart education, business, retail, agriculture and industrial manufacturing etc.

Smart Education System with IOT

IOT Technology has made the digitized system connected with the Internet of Things with sensors, network facility, actuators, and IOT things. Educational members need to adjust with the most recent innovation for their instructing and other training related process. With the utilization of Internet of Things Technology it becomes more helpful for entirely members of education field. IOT technique in education, by various ways as like, The Concepts of IOT containing IOT smart campus and applications. Things, people, process and data have four pillars of this. IOT Technology has made the automatic embedded system covered through the Internet of Things -such as sensors, network facility, actuators, IOT things and IOT in educational areas. Educational members need to adjust with the most recent innovation for their instructing and other training related process. The IOT is beneficial to save cost and time of working digitally, the automate maintenance is a sensor attached to IOT devices detects data by sensor and reacts on that data.

Literatures Review

Objective of this paper as a university of campus with IOT concept which makes lives more comfortable as use of multiple smart objects. The paper discussed the needs & advantages of smart universities as an online platform of where students, teachers, users, visitors work on them explained by multiple ways.

This concept undergoes in categories of sensors that can be used in smart universities. This paper discusses a short model of class room architecture which is based on IOT technology and is shown by use case diagram [1].



The introduction of the IOT use in education the paper represent as network of connecting internet with different objects, sensors as well as other techniques. The sensors which connected in IOT things which stored data in cloud based platform. It has to make different collaboration between educational members and other peoples. In this research IOT based applications are classify in different ways like environment of institute, students health maintains system, enhanced teaching and learning based classroom etc [2].

Paper describes the background technologies and concepts of the framework. Also describes in detail the architecture of our IOT system consisting of four anchor nodes and multiple slave nodes & how the framework can be used to develop a labware. Also the paper describes implementation of a mobile application for retrieving as a Cloud-based data store. It gives feedback from students to improve experience in localization and IOT application design and development [3].

Objective of the paper is to expand the quality of online programming in higher education institutions (HEIs) using IOT technology. In recent job workers completed their certificate exams by using online courses like (mooc's). The collected data from IOT technology used for data mining for report generation by algorithms. Important main concept of new proposed system of IOT is to maintain quality of online materials to become e-learning education. The paper finds understandability of learners by online courses [4].

Objective of paper is to overcome problem, issues faces in transaction of books by faculty members & student in library as like the physical book tracking, Books are not in proper place and achieve members of library etc. Paper uses a Quantitative-Qualitative method for proposed research. Paper represents the first phase of literature review of different library management systems. The second phase related to framework design of all functionalities.

The third phase included a development and Experiment of product. Questionnaire analyzed primary study of systems for doing proposed systems for students, teaching, non-teaching staff & implemented design on the basis of that. The basis of the questionnaire system reduces man power & done systems including smart IOT objects [5].

An objective of this paper is explained the existing condition & proposed work of smart campus for this researcher design of smart campus system. The IOT technology is established in new area of environments. One of from these new areas one of the smart campus implementation is most challenging aspect to the education. A smart campuses useful for education development with new innovation of IOT techniques used in institutes ad classrooms. In this paper explained case study of multiple applications of IOT and its smart connected multiple devices people to people & people to computer interaction helps in development of higher education [6].

The smart attendance system reduces the complexity and saves time in the manual process of the attendance system. Different types of attendance systems are used with sensors like IOT based Roll Caller System, sensors based card system and by Biometric etc. This system uses RFID sensors used to scan students data and stored in the database. This paper describes a new developed model of attendance for reorganization of individual students by this system which reduces working time [7].

Objective of this paper is focused on a climate-controlled class- room environment and lighting factors, by using real time functionality of the system as an aspect to comfort students. Smart objects connected over the internet with other smart objects which are connected with environment sensors in the classroom using IOT technology. Near Field Communication (NFC) uses IOT & cloud technology to monitor classroom & give status of each classroom graphically & to monitor air quality of different classrooms at a university. Collected data stored and analyzed as per suitable for studying students to improve students ability in learning. This same possibility could be used in other applications such as monitoring the conditions in libraries and meeting rooms [8].

The paper express the importance in terms educational departments regarding IOT security, as common use of the internet is increased in day to day life with connecting multiple devices & sensors with each other by cyber-attacks. Security is maintained for information as Linked Data of E- learning



materials. Paper represents an interactive educational material development framework that supports VR/AR & 360VR cameras and needs IOT security information.

Paper describes three steps for designing the linked data for IOT security information as RDF store schema, excel File according to RDF schema & convert of this file in turtle format. Also the paper explained Implementation of the RDF Store schema. It describes management of RDF data of IOT security by virtuoso to maintain IOT security education [9].

Need of Change Traditional Learning system to Smart Learning System

Traditional classroom systems usually blackboard, projector these devices used in the classroom for Teaching and Learning processes but the drawback of these types of teaching and learning methodology is it does not record any activity done. The educational flow of traditional learning to smart learning goes to changes by usage of enhanced technology in the education. The traditional learning system is used printed books and physical classrooms for learning. The traditional changes to Digital learning system uses the digital media and virtual classrooms for learning. Then the change of digital learning by E- Learning which used the Internet platforms and non-centralized system of learning. This latest learning facility in current era is used that Smart Learning system with using IOT Technology, digital platforms and virtual physical technique.

The current need of educational structure to convert education in Digitization and use of smart devices in the classroom to controlled activities done in the education through enhanced smart devices. The auto recording activity or recording of sessions helps students for betterment of learning. The students are able to learn new subjects and are also helpful to those students who are not able to attend classroom lectures for any reasons. The institute uses flipcharts, whiteboards, and interactive electronic whiteboards and IOT embedded LCD projectors etc. Its devices used for data gathered from the classroom and stored those data for the future of education.

Utilization of IOT in Education

Today Institutes are in a procedure of changing into Hi-tech grounds to contact their understudies in a progressively complex way to deal with giving them better offices and administrations. Numerous grounds are outfitted with Wi-Fi administrations, intuitive study halls, video meeting offices, online libraries and many propelled courtesies for sustaining their understudies. Understudies have gotten increasingly subject to innovation for their course contemplates and other related exercises. Particularly in India, where innovation has as of late upgraded during the previous hardly any years, ICT has modernized the conventional method for instruction for improved nature of learning and profitability improvement.

This makes training more engaging than any other time in recent memory. Internet of places and complex virtual-reality platform. Smart learning undergoes the need for education, corporate learning done by framework applied to IOT used for IT infrastructure, workplace architecture, digital & physical smart devices, advised learning work methods etc. E- Learning made education a much innovative, attractive, enjoyable education system. The centrality of this technology is becoming a main part in daily learning and teaching methodologies.

IOT in Education in various Applications

Applications of Internet of Things (IOT) applied in different areas of the education system. This educational system is helpful for Academic as well as administrative purposes. The use of Smart IOT objects in institutes which helps to convert an Institutes in Smart campus. IOT based hot-spot campus connected with objects through the Internet to collect information from sensors, RFID, NFG, QR and other such smart sensors. Smart campus has used multiple smart objects in the institute such as, windows, doors, projectors, printers, classrooms, Garden, water tanks, streetlights, conference room, cafeteria, laboratory, cameras, Labs, parking and building in a single system, which offers smart features to campus. The smart campus has combination of smart classroom, Smart E-learning Applications, Smart Lab, IOT Notes sharing, IOT sensor connected with Mobile Devices, IOT - enabled Hot-spot, Smart transportation, Smart parking, Smart cafeteria, Smart network, Smart learning



and teaching, Smart tracking of student, Smart Building management which help to reduce human effort and maintain security of campus.

The Smart inventory system helps in purchasing systems smartly and smoothly using IOT objects. Smart administration makes admission and administrative work easy using Smart IOT gadgets. The use of these applications in educational institutes categorized into four sub categories as energy maintenance for campus, ecosystem monitoring of campus, students health care monitoring system for students, classroom Management for control and improve teaching and learning etc. The IOT in education helpful in investigating and analyzing different platforms for changing educational structure. There are different categories of IOT technologies, tools and strategies which are used for innovation of smart education: “Digital technology, Enabling Technologies, Internet Technologies, Online Learning Technologies, online Social Media Technologies and Visualization Technologies of AR /VR”. IOT is a subsection of Internet network technology, it includes online learning with embedded objects in education. IOT technology enables institutions as to gather very huge information from connected sensor enabled devices take appropriate actions. Students have access study materials from any space and any time. Faculty members have been used wireless devices like mobiles, laptops in the classroom for data sharing purposes.

IOT Smart Campus with effective E-Learning of multiple smart things containing the different components like LAB Room, share notes, Augmented (AR) enabled smart classroom, featured classroom, 3D virtual objects for capture virtual inputs, Smart display board, Intelligent IOT objects, IOT Robotics etc. These instructive types of applications can be considered as distinct advantages as they give countless instructive games. These games give various highlights that offer fascinating prospects with regards to educating and learning.

CASE STUDY – USAGE OF LEARNING TECHNIQUES

- Case study on Objects connected with Internet

Case study of IOT Expansion of IOT in education provides increased opportunity to careers possibilities. The engineering educational system connects billions of objects connected with internet helped in education. So that the IOT technology impacted on engineering institutes' circumstances and improved the quality of students. The researcher found by literature reviews survey of IOT courses started in engineering students some students haven't knowledge of use IOT technology and how to use IOT objects so it's necessary to include IOT courses in the curriculum in higher semesters.

The strategy of including this elective course in academics is to ready students for new trends and technology, improve excellence of student's projects, and build persons with IOT knowledge. The proposed framework of this IOT elective course of “My Digital Life” includes the different skill sets learning programs, Basic concepts of IOT system and mini projects of 3 credits for 5th semester engineering students & minor projects of 6 credits for 6th semester engineering students.

- Case study on Flipped classrooms

The implementation of IOT application for students prospective for study the Flipped classrooms is used in some countries. Example as FP model developed for works as faculties prepare Lesson plans, animated videos & share them with students before class time, they watch this & ready with preparation in class lecture, So that faculties are analyzing how much students got knowledge from videos. As per Feedback taken from students it shows change in education and its results by implementation of IOT Flipped Classroom and compare with traditional education approach.

The Implementation of Flipped Classroom as an element of the IOT education process future model is developed in education institutes. The IOT Flipped Classroom future model also analyzed the percentage of students viewed videos. In literature review Researcher finds one case study of flipped classroom, researcher finds as 80 bachelor students out of 170 participate in flipped classroom education. The researcher concluded as IOT Flipped Classroom implementation is an effective strategy to improve educational approach.



- Case study on Socio-Economics and Educational

The Socio-Economics and Educational system describe the IOT, 'smart' connected devices have been used to communicate with multiple devices for sharing information in the network. This concept of IOT is used to change teaching aids as well as infrastructure of educational Institutes and change the teaching and learning process of education. It is very beneficial to students, teachers, administrative & Management. The University of padova built an integrated model to study web service models for wireless sensor networks to find use of IOT structure of education. It creates an education field with new ideas for betterment lives of students and teachers. The IOT set up in academic 'smart teaching and learning' impacted on growth of education, including smart classrooms, smart labs, Smart E-learning Applications, IOT sensors for Notes sharing and an entire smart campus with smart building, smart tracking of students , smart inventory , smart lighting , smart parking etc [10].

- Case study on Virtual Academic Communities (VAC)

Objective of the paper is the term education implied in this paper as 'Smart Education', by using IOT resources or objects connected with each other, for this model is proposed as Virtual Academic Communities (VAC) which are tested by multiple case studies. Implemented designed model connected with objects and tested by case study.

The result of model is the model is very effective for teaching and learning. Paper explained in detail the proposed approach of the IOT system controller, divided it into core components such as teaching and learning, security, Management, Environment, Health and Hygiene, and discussed the working of the proposed model [11].

- Case study on Problem-based learning (PBL)

Objective of the paper is to teach new skills design courses of emerging technologies for engineering undergraduate students for IOT based application in hospital system. Purpose of course are to know information related to IOT & course design. Paper discussed in a detailed framework of course development by Problem-based learning (PBL) for student learning & experience, Technical pedagogical content knowledge (TPCK) teaching material & Industry collaboration framework model using PBL service [12].

The Course development case study on new ideas devolved of members of education and design of course by Course Description, course syllabus. It concluded the result of surveys of students, industry partners and faculty members shown as good reaction seen from students by this experience.

- Case study on Business modeling of SME's employee

The case study on IPSKC Business model of industry collaboration workshop on IOT for engineering program in Japan which decided small courses for IOT technology. This program recruits some IPS students which having experience of work.

It discussed as 3 preliminary case studies in which first is 26 different types of IOT use case defined in study second case study on hand on technology field trip in local town areas & third case on new business modeling of SME's employee which based on first two case studies. Paper evaluates analysis of the user experience of state-of-the-art commercial IOT application software on the basis of questionnaire in workshop. [13]

- Case study on Ubiquitous Learning

This Paper on case study describes current learning techniques of learning anything, anywhere, anytime culture used in a learning process environment which is supported by wireless devices like mobile embedded computers etc. This chapter of this book represents the survey of sensors & edge devices used in applications of ubiquitous learning for this author finds Previous Work on Ubiquitous Learning Applications.

Also this case study takes a survey in topology of components used in ubiquitous learning which depends upon science and technology related learning and lastly chapter describes the how architecture of this learning is based on Future Prospects and Recommendations [14].



- Case study on VAC model

This paper discusses VAC model for connecting various objects of IOT. This architecture is developed and testing this model in education for teaching and learning with new innovated way which makes online educational platform. The planned architecture of this model contains of various layers like Hardware Layer, Messaging layer, Services Layer, Application Layer. According to these research studies the linking of IOT which enhance the digital learning of educational members. In this paper two test proposed model case studies have been implemented. It conducted a survey of questions about the "technological profile" & students performance in practically use of this technology [15].

- Case study on Socio-Economics

In this paper writer describes research study for digital campus of standard university including electronic devices and networks as mobile desktop and electronic learning facility. This considered a socio-economics case study by using ICT and IOT tools. Paper describes bifurcated in two ways as large scale & small scale devices consists a mobile phones, tablets.

In paper analysis of IT skill before and after in use of digital campus. This paper introduced new online line courses with learning materials like MOOCs. The authors conclude that this innovated electronic things and cloud based services are used in the campus of university that should be increased in education and in a students' enhancement in daily life & quality [16].

- Case study on Technical and Vocational Education

The training methods for students for new innovations in technological as well as of professional education. Different types study methods are used in student learning processes which consist of problem based learning with correlated with students and others.

These consist of case study on data sources on this educational learning for graduates bachelor program. It progresses employability skill uses in practical processes for electrical & electronics engineering students. The paper represents some limitations over the method testing. As per paper discussion that new developed this type of courses included "Internet of Things" subject, with new courses content [17].

- Case study on IOT Innovated framework.

This case study describes STEM and CS education with IOT as an emerging network infrastructure connected via the Internet. With this chapter, discussed objectives as introduce the terminology of IOT & its architecture CS stream of courses.

This courses included arrangement of new aspects in the education with 3 layered architecture. Also chapter, discussed Frameworks which included relation of IOT with new innovated framework. The abstract new model constructed of education system with enhanced features. Case study and experiments with concentration on CS stream discussed throughout the book [18].

- Case study on Mobile Robots

Paper represents IOT technology used for integrating & constructing this technique for teaching & learning of education. The reference model of IOT required as to link with physical equipment. The term collaborative learning refers to students interacting actively with each other. In the paper educational robotics refers to CSCL mobile components or things treated as mobile robots. The paper describes a case study of course aimed to teach 4th year students of technology the concepts of basic theory of robot maintaining system with detailed explanation with algorithms. The data analyzed by questionnaire to measure emotional interest of students.

This term collaborative adapting refers to the students who interacting actively, with each other. In this paper knowledgeable robotics refers to the CSCL mobiles components or things treated as of mobile robots [19].

- Case study on Smart Schoolhouse

The paper discussed Improvement and focus on STEM stream for organizing learning of students as per technical way. Objectives of this paper is the feature of IOT based schools and projects. These concepts of "Smart Schoolhouse by means of IOT" used in education for this it uses different learning approaches. Paper describes how the project uses how to IOT devices shared information & knowledge



with others. This project involves various types of IOT things which tested by participated 19 schools in the project & result is analyzed [20].

IOT Could Change Education

In Internet of thing (IOT) a primary concept is connection between multiple gadgets through the internet. The IOT has changed the way of education by helping different ways.

- Individualization: It implies that understudies the home learning framework.
- More chances to learn: Virtual class room teaching, individual partners assist understudies with learning at wherever or district with no difficulties.
- Effects: At last, accordingly, understudies improve their learning progress and instructors can utilize IOT in the accompanying manners.
- Advanced devices: All material can be given to instructors utilizing unique devices, and they assist them with giving new material to understudies in an all the more top notch way.
- Tracking. Utilizing IOT, educators will realize who goes to their group and who is missing, and it will be done consequently.
- More opportunity: IOT helps educator's make the teaching process increasingly adaptable.
- Executives additionally can utilize IOT and apply it to class the executives.
- Monitoring of building of campus, new developed frameworks, warming frameworks naturally utilizing extraordinary gadgets.
- The security level can be expanded fundamentally: Abilities of IOT for training, it will take care of numerous issues and break primary hindrances that existed previously.

Conclusion

IOT has a new innovation in recent trends which have been interconnected with various objects with human life. IOT is an activity which interact and communicate with different aspects through network facility. The case studies evaluated the significance of digital learning. The digitization changed traditional learning facility and express the important role in Smart education

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