INTERNET OF THINGS BASED EMERGING SMART TOOLS FOR NEW EDGE EDUCATION

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Abstract

Internet of things (IoT) in teaching and learning process boosted advanced technological based educational market. IoT enables with primarily based interchanges to arise among physical gadgets, sensors and controllers. As per statics till 2018 the connected devices are 23.14E billions. Technology is playing important role to provide advanced knowledge to students in the current era. In the current digital era, teaching and learning process updated with latest E-Learning platforms. E-learning environments in situations are stretched out from truly digital solutions to both physical and digital and another developing improvement of the web enable with IoT. In which without having object to object or object to machine interest IoT data are trade over a framework. In this situation, either individually or group learning process could be experienced by students. Uprising with latest technology to adopt IoT based learning in educational institutions. Institutions are joining hand to hand with technical based companies to provide advanced tools for students. This research paper is based on secondary research. In this research, researcher has focuses on the effect and innovation in modern teaching and learning process. The researcher also covered few business models enables with latest technological tools.

Keywords: IoT, Smart Campus, Teaching Pedagogy, Devices

1. INTRODUCTION:

The "Internet of Thinks" (IoT) is turning into an increasingly growing of communication each inside the place of business as well outbound. IoT usually connecting any devices with an on and rancid switch to the internet. This includes the entirety from smart phones, coffee makers, washing machines, headphones, lamps, wearable gadgets and nearly all electronic devices. As per research by analyst firm Gartner, by 2020 there will be over 26 billion connected devices reach to doorstep to individuals worldwide. Kevin Ashton introduced Radio-Frequency Identification (RFID) tags used in corporate supply chains to the internet in order to count and track goods without the need for human intervention. Smart connectivity is

possible with existing networks and context-aware computation using network presence of WiFi and 4G-LTE wireless. Secondary data were collected for the study from leading journals, magazines books and websites relating to technology

Objective of the study:

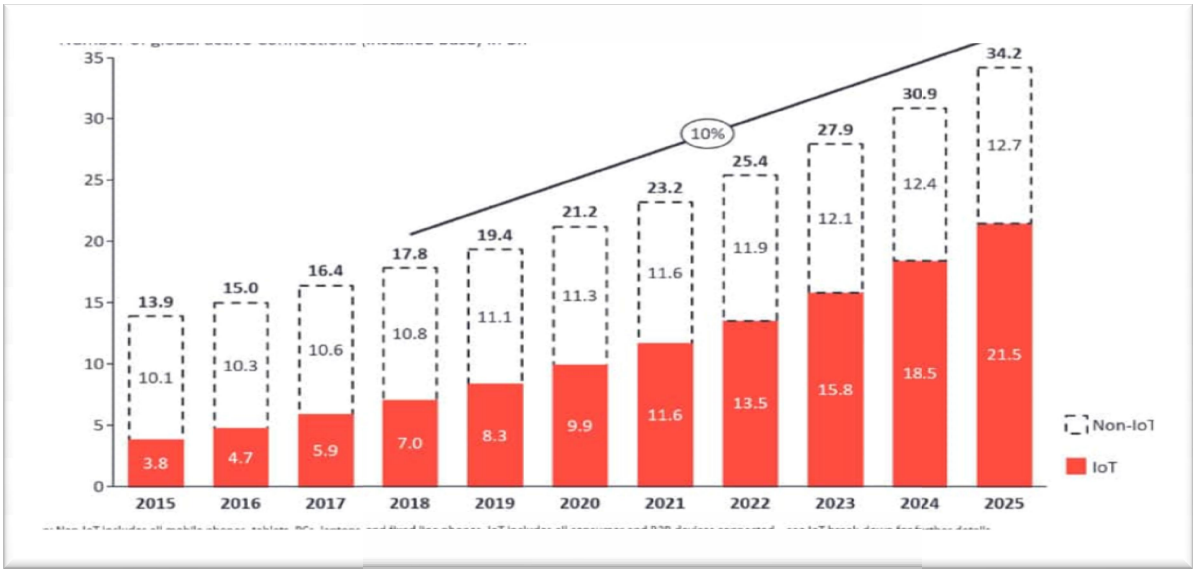
- To study the growth of Internet of Things (IoT) in advanced teaching pedagogy with proper infrastructure.
- To study the e-learning environments and IoT-based Smart Campus

2. STATISTICAL UPGRADATION OF IOT MARKET

As per McKinsey Global Institute,

- IoT devices expected to be more than 64B IoT devices worldwide by 2025
- The global IoT market is forecast to be worth $1.7T in 2019
- By 2022, 100% of the global population is expected to have LPWAN coverage
- IoT has the potential to generate $4T to $11T in economic value by 2025
- Approx. 127 new IoT devices connect to the internet every second.
- Main revenue driver for 54% of enterprise IoT projects is cost savings
- More than 80% of senior executives across industries, on average, say IoT is critical to some or all lines of their business in 2018
- 97% of organizations feel there are challenges to creating value from IoT-related data
- Most IoT devices are those we're using at home, or at work. As of 2018, over half of all IoT devices were connected to Wireless Personal Area Networks, such as Bluetooth, Zigbee, and Z-Wave. (*Source*: IOT Analytics)
- The global IoT market was worth over $150 billion in 2018 and is expected to exceed $1.5 trillion by 2025. (*Source*: IOT Analytics) IoT adoption to approach 100% over next 10 years and gaining momentum on various factors.

Table 1: Total number of active device connections worldwide

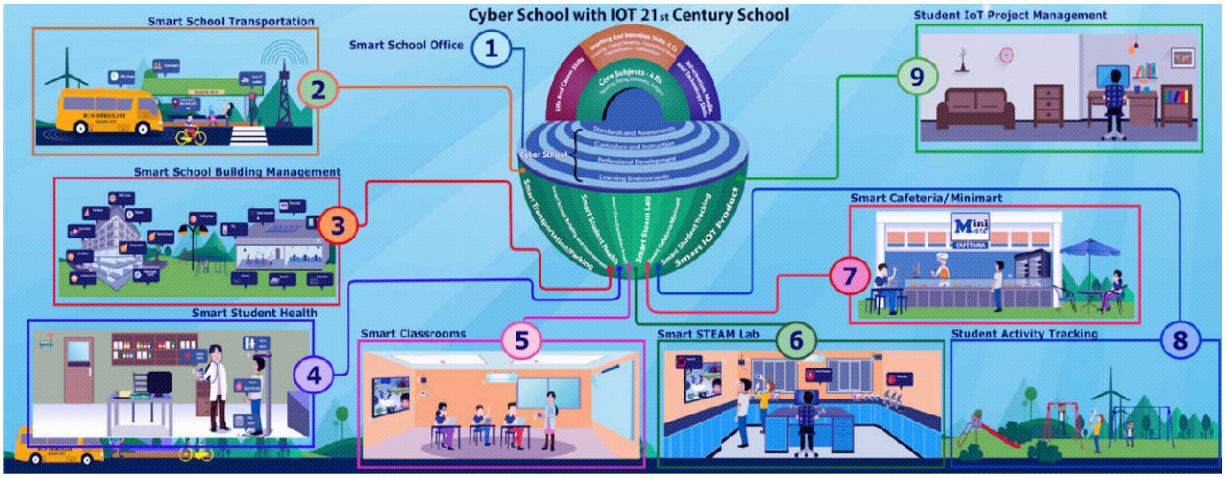


Source: *IoT Analytics Research*

Above table 1 shows that Total number of active device connections worldwide of IoT based devices and non-IoT based devices.

4. KEY DEVELOPMENTS IN IOT IN TEACHING & LEARNING PROCESS

These are some important areas where the Internet of Things Application in Education.



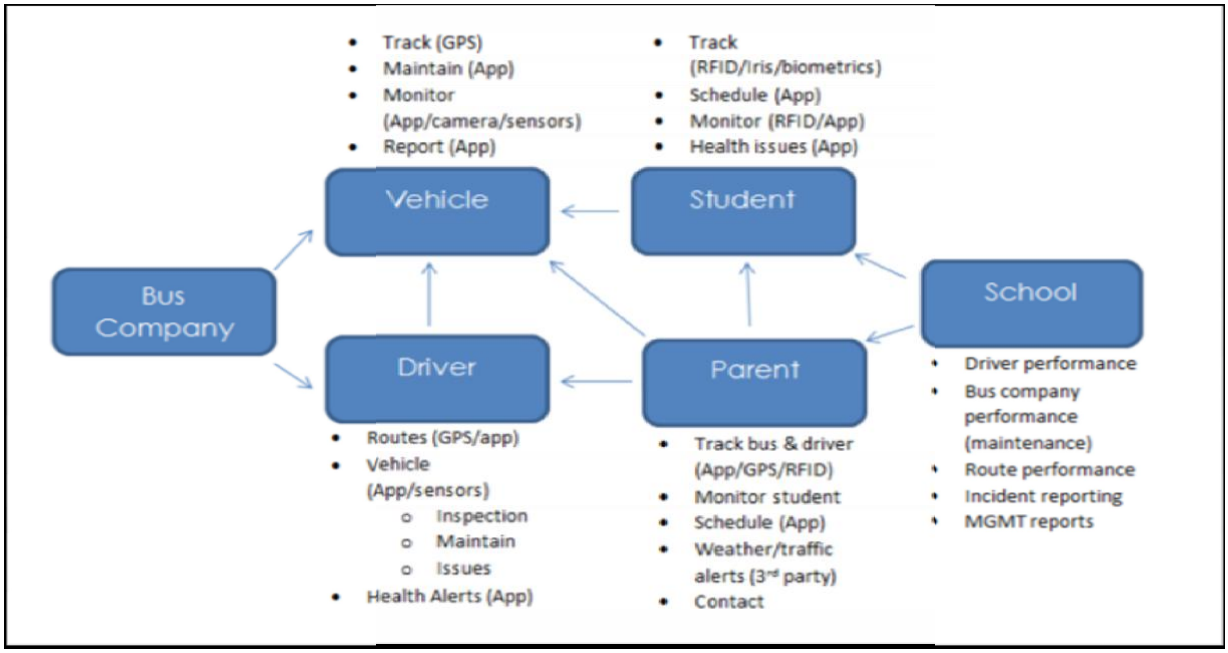
Source: data-flair.training

4.1. Smart Vehicle Management

The school vehicles can be tracked and managed effectively with the help of smart technologies. The following are the few aspects of smart vehicle management refer fig.1.

- **Bus Attendance:** Each student's attendance is updated on a custom cloud application using data gathered from the RFID (Radio-frequency identification) reader or iris scanner.
- **SMS Alerts:** Automated pick up and arrival alerts are sent to parents via mobile.
- **Route Adherence:** Get alerts when the bus driver goes off route to save fuel, time and ensure safety.
- **Live Tracking:** View the bus travel live on the map, giving more insight to safety.
- **Emergency Management:** In the case of emergency, select the bus route and the details of students such as blood group and contacts mailed to the hospital immediately.
- **Voice Call:** The driver can make emergency voice calls to receive information from the school through handsfree communication

Fig 1: Smart Vehicle Management



Source: Shrinath ,Vikhyath , Shivani , Sanket , Shruti (2017), "IOT Application in Education", Shrinath et al, International Journal of Advance Research and Development, Volume2, Issue6

4.2. IoT-based Smart Campus

Smart campus may include following:

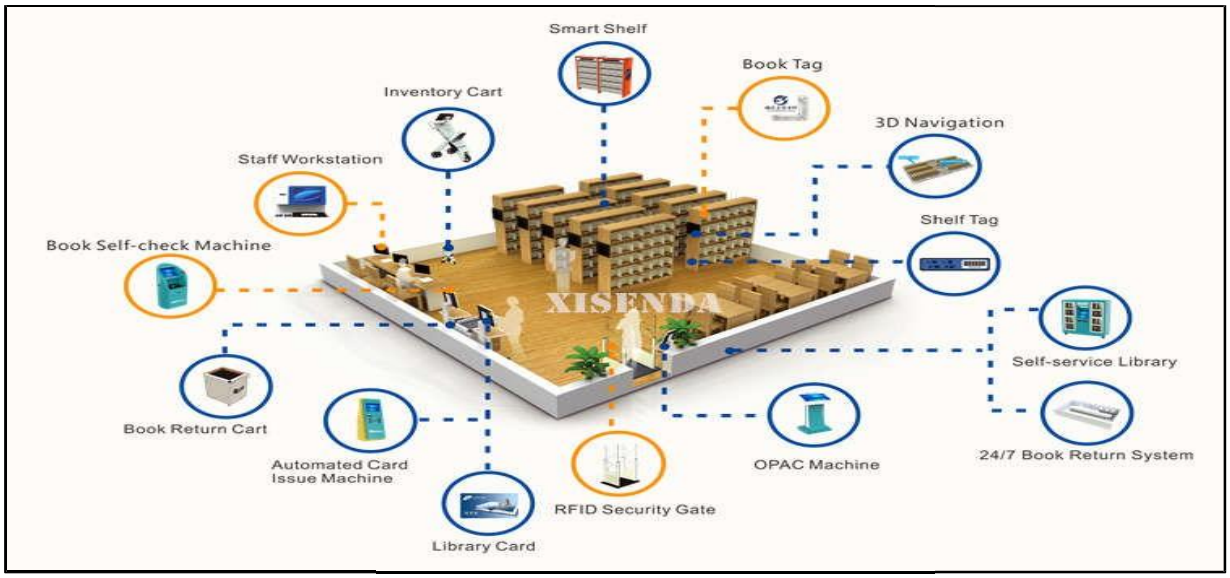
- Smart E-learning Application with IoT
- Smart IoT-based Classroom
- Smart IoT-based Library
- IoT Sensors for Notes Sharing
- IoT Sensors for Mobiles Devices
- IoT-enabled Smart Classrooms
- Smart parking,
- Smart inventory,
- Smart lighting,
- Smart tracking of students, goods and equipment using RFID technology

4.3. Smart Library: New generation library management system based on RFID (Radio Frequency Identification) technology refer fig.2.

Key Benefits

- Free the staff out of regular duties due to self-service functions;
- Quick material tracking with OPAC, 3D navigation and the RFID network;
- More efficient inventory with non-contact multiple-tasks stocktaking;
- Automated materials handling with return and sorting system;
- Big data analysis for optimized material acquisitions and distributions;
- Automatic security detection with sound and light alarm

Fig 2: Smart Library



Source: *www.xisenda.com*

4.4. Smart Classroom Attendance System

A study proposed an efficient Smart Classroom Roll Caller System (SCRCS) using IoT architecture to collect or record student attendance after every period accurately and timely. RFID tags are attached to the Students' ID cards. For proper reading SCRCS can be installed in classrooms. It shows not only the total attendance on LED display at the beginning of any class but also shows the all identity card on multiple slots of SCRCS. The record of a student's attendance is also kept at the academic office.

4.5. Real-Time Feedback on Lecture Quality

A study proposes a creative environment that can monitor and observe students' reactions to a lecture using sensing and monitoring technology. This system will help to take real time feedback of faculty.

5. VARIOUS BUSINESS MODELS CONNECTED WITH INNOVATIVE TOOLS

5.1. Promethean : Promethean is multitouch interactive displays with dry-erase and natural writing technology, cloud-based lesson delivery software and personalized training module for faculty members

5.2. Scanmarker : Scanmarker is an innovative tools to quickly scan editable text from books, papers and other documents directly into a phone, tablet or computer. Such text can be translatable into more than 40 other languages. Reading and listening to text while you scan it is

an excellent way to study quickly useful the information for exams. It saves time and energy with modern technology

5.3. Sweetrush : SweetRush is an e-learning tool for designs, builds and tests education solutions. Customized instructor-led training provides efficient feedback and tools like competitive games and audio/video animation help increase participation and retention.

5.4. Blackboard : A digital learning environment personalizes the educational experience, virtual classroom technology increases collaboration and branded websites keep parents, students and others updated with the latest grades, attendance, events and news.

5.5. Lococobo: A provider of programming and robotics education, LocoRobo uses robots to teach coding languages like Python, C, Javascript and MATLAB.

This tool is equipped with various sensors that respond to touch, light, sound etc, it learns both from its environment and human interactions.

5.6. Kaltura: Kaltura's video management and creation tools provides students and faculty members classroom to create, edit and deliver live or on-demand high-quality video to any device with the objective enhancement of interaction and creativity to improve the overall e-learning experience.

5.7. Kajeet: Kajeet makes wi-fi systems for use in "smart" school buses. Wi-Fi enabled school buses collected to students finish and turn in homework, drivers with the ability to monitor student behavior. This is helpful improve secured tools to track their kids bus.

6. CHALLENGES WITH INTEGRATION OF IOT IN TEACHING & LEARNING PROCESS

- Network bandwidth,
- Reliable Wi-Fi connection,
- Web analytics,
- Security,
- Privacy,
- Availability of devices for students,
- Teacher training

- Cost of equipment

7. CONCLUSION

IoT has opened the doors for new and innovative ideas to bring ease and betterment in the lives of both students and teachers. Research is being conducted in designing IoT-based teaching platforms including smart classrooms, smart labs and entire smart campuses. IoT-based smart learning applications and still much more is left to study regarding IoT in teaching & learning process. Though there are various advantages of IoT in education but may have to compromise privacy and security. In the future new techniques may be introduced that can resolve all these issues.

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