Internet of Things (IoT): An Educational Need

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Abstract:

Education around the world is experiencing major paradigm shifts in educational practices of teaching and learning under the umbrella of ICT enable learning environment. The world is witnessing spontaneous growth in communication technology computer network and information technology. Development of new broadband communication services and convergence of telecommunication with computers which can be set to be the internet of things have created numerous possibilities to use a variety of new technology tools for teaching and learning systems.

The Internet of things is so much into everything these days that it has started to be called as Internet of everything. It is not very surprising that internet of things, as it is now called has made its way into the education industry as well. Keeping in the mind the intervention of computers and smart phones into our lives and its effect on the educational system today, it. Sounds a bit farfetched at first for the internet of things to do anything with the education industry. While some of the effect that internet of things can bring into the education sector are apparent but some will be implicit and are likely to make a silent change from the inside. The internet of things can begin disrupting the education on procedure as early as kindergarten and can continue to do so through 12th standard but perhaps most profound effects occur in higher education. We will discuss the change that the internet of things can bring into the field of education and the challenges and impact of the internet of things in the 21st century education sector.

Keywords: Internet of Things, Internet, Education

Introduction

The concept of linked devices or things has given a new rise of the internet, anywhere can get connected with the internet and become 'smart' connected devices can communicate with each other and share information which can then further be processed to take some decisions. This whole concept is named as 'internet of things'. IoT is an automation and analytics system which exploited networking sensing big data and artificial intelligence technology to deliver complete system for a product or services. These systems allow supervision transparency control and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operation and much more throw smart devices and powerful enabling technology.

Key Features of Internet of Things (IoT)

The most significant features of IoT include artificial intelligence, connectivity, sensors, active engagement and small device use. A brief review of these features are–

✓ **Artificial Intelligence (AI)**

IoT essentially makes virtually anything smart, meaning it enhances every aspect of life with the power of data collection, artificial intelligence algorithms and networks. Specifically IoT networking mean networks are no longer exclusively tied to major provider. Network can exist on a much smaller and cheaper scale while still being practical. IoT creates these small networks between its system devices.

✓ **Sensors**

IoT loses its distinction without sensors. The act as defining instruments which transform IoT from standard passive network of devices into an active system capable of real world integration.

✓ **Smart devices**

Devices as predicted have become smaller cheaper and more powerful over time. IoT exploits purpose built smart devices to deliver its precision, scalability and versatility.

✓ **Active Engagement**

Much of today's interaction with connected technology happens through passive engagement. IoT introduces a new paradigm for active content, product or service engagement.

Internet of Things in Education

Internet of Things (IoT) customizes and enhances education by allowing optimization of all content and forms of delivery. IoT enables educators to give focus to individuals and their methods. It also reduces cost and labour of education through automation of common tasks outside of the actual education process. The internet of things the connection of devices to the internet is in the process of transforming numerous areas of our daily lives. The internet has deeply rooted itself into our academic institutions and electronic learning has become common practice in the academic institutions system. The rise of mobile technology and the internet of things allow academic institution systems to improve the safety of their campuses keep track of key resources and enhance access to information. Accommodations can even use this technology to create smart digital lesson plans rather than the traditional stonic plan of yester year.

Some academic institutions may utilize it to save money or harness data, some will prepare students to be extremely tech literate, others will find creative uses for their specific needs. Dreams of personalized detail instructions and seamlessly interactive technology will unhead-to-head with funding issues and current test based accountability systems. In order to include the internet of things in education, our understanding towards education must shift.

Many educational institutions vigorously incorporate technology into learning, list of all reach out and connect to each other. Massive adaptation of technology in education is required so that the power of IOE can be realized and learning can become more authentic and relevant throw engagement beyond the classroom.

The proliferation of mobile devices will also enable educational institution to collect data to interpret a learner's behaviours and activities. Used intelligently such data will result in personalized learning targeted to individual needs, learning styles, and aspirations. There are myriad uses for technology in education but many are piece meal and ad-hoc with little informed thinking. IoE has the potential to integrate technology with learning in many ways.

Impact of Internet of Things in the Education Sector

The following are the sum of the impact of internet of things in the education sector:

Promote Personalized Education

Internet of things (IoT) facilitates the customization of education to give every student assess to what they need. Each student can control their experience and participate in instructional design, and much of this happens passively. The student simply utilizes the system and performance data with organizational and educator optimization delivers highly effective education while reducing cost.

Create Global Networking

Learners can interact with peers, mentors and educators worldwide using connected devices such as interactive boards and digital highlighters, while sitting in the comfort of their classroom or home. Digital scanners at the learning experience by digitally transforming text to smart phones. In this way internet of things create a global networking among learners and educators.

Enrichment of Smart QR Code Utilizations

Quick responses (QR) codes have made their way into the academic textbooks. Feedback assignments and additional information resources become easily available to students when they scan the QR code with their smart phones. Have students us QR to create resumes that link to others content such as their professional website or portfolio. All institutions do some level of resume building and technical writing. Help them bring it into the 21st century by creating a resume that requires interaction. Not only will this help engage them in technical writing, but also their work will be innovative. In a lab, a (Quick Response) QR code could launch a virtual tour of the lab or a video showing how to operate the equipment.

Easier of Data Collection and Analysis

Learners use radio frequency identification (RFID) Chips/ Bluetooth to tag a track physical objects or even birds and animals around the clock irrespective of the weather or other conditions and school/ colleges have started to initiate automatic data analysis using applications based on the cloud. Learners gain a richer learning experience as they can get real time insights into subjects they would otherwise only learn from their text books. Using RFID ID cards, students can be automatically scanned and detected. Using RFID/ Bluetooth valuable assets such as tablets and laptops can be tagged and tract for real time locating.

Collaborating in Group Works

Educational institutions encourage a collaborative atmosphere with the help of internet of things. While working in groups students are encouraged to transmit their data to a collaborative work area by simply scanning and RFID tag or a QR code, using their smart phones.

Superior Safety in Campuses

Digitized identity card and wristbands are used to track staff, students and visitors. Data on the last non locations are stored on a server which ensures that every area on campus is assessed only by the right people. The card and wristbands also act as digital wallet and enable cashless payments. Institutions buses are also enabled with GPS tracking which makes the journey to and from school safer and let's parents known their Childs where about. Institutional officials are under pressure to ensure their campuses are safe. The IoT's ability to track objects stop and a students to connect devices across

campus bring a new level of safety of institutions. A GPS enabled bus organism means that bus routes can be trapped so that parents and administrators can know where a given bus is at any given time. In addition to making the school journey safer for students (and a lot less stressful for parents); students can be notified when the bus is near their pickup location, no more waiting outside for a late bus.

Enhanced Learning Experiences and Outcomes

The pressure is on to prepare learners for an increasingly competitive workplace in hyper-connected world. With the internet of things institutions can enhance education about comes by providing richer learning experiences and the performance of learners. Whether it's a tablet they brought from home or an institutional issued laptop, more and more student learning is taking place on wireless devices. These online lesson plans have the potential to characteristic highly engaging interactive content. However, they also have the potential to 'crash' archai internet networks. With e-Learning applications, student can work at their own speed, which allows the teacher to provide one to one instruction to those who need it most.

Efficient Institutional Management

Streamlining day-to-day operations using the internet of things helps the institutional management and teachers focus more on teaching. It allows them to automate task that would require considerable time and effort when performed manually. For example, connected devices can detect a student's presence in the school and eliminate the need for taking attendance manually and submitting the information at a central office. Identity cards and wristbands allow educational organizations to store the last known location of a student or visitors, helping to make sure the right people are assessing the right area on campus. They also enable cashless payments at the institutions, cafeteria or campus store which create a more smooth transaction and has the potential to discourage bulling and theft. Finally, the convergence of campus communication allows staff to react more speedily in an emergency situation.

Factors to Influence the Integration of IoT in Education

For successful integration of IoT devices in a classroom environment and education provider may have to face many difficulties like network bandwidth, reliable Wi-Fi connections, web analytics, security, privacy, availability of devices for students, teachers training and cost of equipment etc. The following are some of the factors that will enhance wide spread and adoption of internet of things.

Security and Privacy

Educational institutions are frequent victims of data breach. With research data, student and alumni personal records, health centre records, payment information for tuitions, housing, food and books, the data security need of the education market are wide spread. Beyond providing a secure regulation that mandate data security for every type of information is stored by educational institutions. This might pose a great threat to IoT security particularly in education. Without assurances, pervasive development of IoT will not take place across educational institution.

Data Integrity

Integrity of data must also be assured as well as it's accuracy, authenticity, timelines and completeness. Success will be predicated on an "open platform" that allows all parents working together to use the

same baseline technologies. Educators will need to work closely with government to ensure the development of IoT in education; at the same time government must preserve the safety and security of its citizens. Another aspect of data integrity that is becoming increasingly important is related to the use of technology in research projects for data collections, storage, analysis archival etc. These technologies is include electronics instruments and hand devices for collecting data. But the use of technology can create additional integrity concerns that researchers must be prepared to deal with an act responsibly. Adequate training of teachers and students in the applications and implications of technology use can help to prevent technology related integrity violations.

Reliable Wi-Fi Connections

There is continuous need for new technology for education like high speed wireless network which provide the bandwidth for audio and video streaming of lessons. Therefore the cost of devices and equipment is another challenge.

Lack of Qualified Teachers to Teach ICT

The demand for ICT learning has been tremendous and number of teachers who are trend to teach ICT cannot meet the demand. There are more students willing to be taught computing skills than there are teaches to transfer the skill.

Unavailability of Resources

Computers are still very expensive especially in developing countries and despite spirited efforts by the government agencies, NGO corporate organizations and individuals to donate computer to as many schools as possible, there still remains a big percentage of the students unable to purchase computers for their use.

Educational Policies

Policies that encourage adoption of technology in the classroom by students and its effective integration into curriculum are crucial. Such policies must include sound change management practices among educational institutions to reduce the barrier of technology adaptation and increase its scale. Professional development programmes for educators should incorporate IoE tools to encourage early adoption and help educators developed innovative methodologies and appropriate pedagogies for the learning development.

School Curriculum

Curriculum is a vital part of any school sitting and as such should be taken without most concern. It is therefore advisable for school administrator to imbibe IoT into their curriculum design so as to enhance its adoption by creating an environment that will promote its uses.

Conclusion

Today, we have various ways to teach skills that students will need in a global IoT world, which has totally changed our perception for different services, but we don't always implement them effectively in the classroom. To fulfill the requirements of future-proof education, the educators and institutions need to integrate IoT platforms into science and engineering curricula to help students develop digital literacy

and innovation skills. Moreover, AI based data analysis and adaptation strategies will be required to provide student centric progress driven contents that enhance level of understanding while boosting the receptivity of the students through multimedia contents. We also discussed the short term, medium term and long term trends in education and use of supporting technologies to prepare the future students of Smart Societies.

References:

1. Anca Mustea et al, "Integrating E-learning into the Transdisciplinary Methodology as a Solution to the Challenges of 21st Century Society", 1877-0428 © 2014. Published by Elsevier Ltd.
2. Ahn, J. (2013). What can we learn from Facebook activity?: using social learning analytics to observe new media literacy skills. Paper presented at the Proceedings of the Third International Conference on Learning Analytics and Knowledge, Leuven, Belgium.
3. Barron, A. E., Kemker, K., Harmes, C., & Kalaydjian, K. (2003). Large-Scale Research Study on Technology in K–12 Schools. Journal of Research on Technology in Education, 35(4), 489-507.
4. Bauer, J., & Kenton, J. (2005). Toward Technology Integration in the Schools: Why It Isn't Happening. 13(4), 519-546.
5. Bebell, D., & O'Dwyer, L. M. (2010). Educational Outcomes and Research from 1:1 Computing Settings %J Journal of Technology, Learning, and Assessment. 9(1).
6. Brown, J. L. (Producer). (2017, March 17). How Will the Internet of Things Impact Education? edtechmagazine. Retrieved from https://edtechmagazine.com/k12 /article/2017/03/how-will-internetthings-impact-education.
7. Carbonaro, M., King, S., Taylor, E., Satzinger, F., Snart, F., & Drummond, J. (2008). Integration of elearning technologies in an interprofessional health science course. Medical Teacher, 30(1), 25-33.
8. Domingo, M. C. (2012). Review: An overview of the Internet of Things for people with disabilities %J J. Netw. Comput. Appl. 35(2), 584-596.
9. Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types. Journal of Research on Technology in Education, 41(4), 393-416.
10. Hollier, S., & Abou-Zahra, S. (2018). Internet of Things (IoT) as Assistive Technology: Potential Applications in Tertiary Education. Paper presented at the Proceedings of the Internet of Accessible Things, Lyon, France.
11. Klopfer, E., Sheldon, J., Perry, J., & Chen, V. H.-H. (2012). Ubiquitous games for learning (UbiqGames): Weatherlings, a worked example. 28(5), 465-476.
12. M Cvjetkovic, V. (2018). Pocket Labs Supported IoT Teaching (Vol. 8).
13. Maksimovic, M. (2017). TRANSFORMING EDUCATIONAL ENVIRONMENT THROUGH GREEN INTERNET OF THINGS (G-IOT).
14. Maryam Bagheri, S. H. (2016). The Effect of the Internet of Things (IoT) on Education Business Model. 2016 12th International Conference on Signal-Image Technology & Internet-Based Systems. IEEE.
15. Meacham, S., Stefanidis, A., Laurence, G., & Phalp, K. (2018). Internet of Things for Education: Facilitating Personalised Education from a University's Perspective.

16. Prof. Dr. Srisakdi Charmonman, P. M., Vo Ngoc Dieu, Niek van der Linden. (2015). Applications of Internet of Things. Paper presented at the The Twelfth International Conference on eLearning for Knowledge-Based Society, Bangkok.

17. Suja P Mathews, D. R. R. G. (2017). Solution Integration Approach using IoT in Education System. International Journal of Computer Trends and Technology. (IJCTT) 45-49.

18. Mehmet Aydeniz, "IoT in Education: Integration of Objects with Virtual Academic Communities", Springer International Publishing Switzerland 2016 Á. Rocha et al. (eds.), New Advances in Information Systems and Technologies, Advances in Intelligent Systems and Computing 444.

19. Wing, J. M. (2006, 03 01). Computational Thinking. COMMUNICATIONS OF THE ACM, 49(03), pp. 33- 35.