Chapter 1
Internet of Things (IoT) to Foster Communication and Information Sharing:
A Case of UK Higher Education

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ABSTRACT

IoT is a rapidly emerging technology in education that attracts researchers, students, and administrators. This chapter reviews the opportunities and challenges of the IoT to determine whether there are potential communication and information sharing cultures in higher education institutions (HEIs). Despite the findings revealing stakeholders' demand for a better collaborative learning environment and better information sharing capabilities, IoT has various security and interoperability concerns that present an unattractive prospect for HE stakeholders to embrace IoT. IoT has the potential to meet HEIs system expectations, though stakeholders remain distant toward embracing IoTs. This indicates that stakeholders are not ready to embrace IoTs, thus prompting the need to study why stakeholders are resistant towards the IoT.

INTRODUCTION

Modern Information and Communication Technology (ICT) solutions and strategies have recently transformed the traditional educational process resulting in better quality education systems at various levels of learning (Maksimović, 2018). There are currently seven known categories of technologies, tools, and strategies have been a potential game changer in the education sector: visualization technologies, social media technologies, learning technologies, Internet technologies, enabling technologies, digital strategies and consumer technologies (Rushby & Surry, 2016). The Internet of Things (IoT), for example,

is an internet technology that has enabled small devices to become connected to the Internet, which in turn provides an opportunity to make remarkable developments in many facets of life (Majeed & Ali, 2018). IoT in the education domain has successfully bridged the gap between the requirements needed for both traditional education systems and contemporary education systems through the transformation of an interconnected sharing and collaborative environment. This has been brought together by internet based information and communication tools and strategies that form this sharing culture.

Kevin Ashton first coined the term "Internet of Things" in 1999, which describes a unique set of interoperable objects connected via radio-frequency identification (RFID) technology (Gawali & Deshmukh, 2019). Similarly, Oberländer et al. (2018, p. 488) states that IoT facilitates the connectivity of physical objects that include sensors and actuators in the form of data communication technologies that are powered by the internet. These definitions suggest that the significant growth and ubiquitous penetration of the IoT can be attributed to the rapid increase in smart device usage within the past decade.

The advanced development and ubiquitous nature of internet technology has led to a world where devices are able to be interconnected to the internet, thus providing anytime anywhere access to information. The IoT are a technological innovation of pervasive computing that is developing a worldwide network of the information society, which facilitates novel and complex services (Patel & Cassou, 2015). For example, Universities are currently using the IoT, such as campus-wide Wi-Fi that allow students and staff to use their mobile devices to access information regarding the campus according to their location e.g. guiding lost students using interactive map data or even check the availability of study rooms. By 2023, the size of the IoT in Education market is expected to grow to $11.3B due to the increased use of connected devices in educational institutions (Petrov, 2019).

Various supporting technologies are responsible for the IoT growth, such as developments in smart devices, broadband availability, reduced cost of connected devices and energy efficient systems (Talari et al., 2017). Similarly, a 2015 report about the IoT found that the rise of other technologies, such as cloud computing (M. Ali, 2019; Ali, 2020; M. B. Ali, 2019; Mohammed Banu et al., 2018) and big data has influenced the technological ecosystem that has facilitated the emergence of the IoT (Rose, Eldridge, & Chapin, 2015). With the proliferation of smart technologies, the IoT is a new wave of ubiquitous connectivity. Moreover, Gómez et al. (2013) asserted that developments in nanotechnology (small technologies used mainly in the scientific field) have facilitated the manufacturing of miniature devices that can be inserted into various systems with additional functionality of efficiently connecting to the Internet.

Although the IoT is an emerging technology that brings together both virtual and physical devices based on existing ICTs, there are several limitations such as a lack of security, privacy and trust in the IoT, which may dissuade stakeholders from embracing the technology (Hsu & Lin, 2018). For those reasons, this research explores the opportunities and challenges pertaining to the IoT as an ICT strategy to facilitate communication and information sharing among stakeholders associated with Higher Education Institutions (HEIs).

THEORETICAL BACKGROUND

The IoT today are fostering new technological innovations that are changing the face of industry. This growing trend has been fostered because of the convergence pertaining to wireless technologies and the developments in the internet. This makes any object a smart device that is able to communicate unobtrusively. Although the IoT provides opportunities to enhancing information and communication

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