

ROBOTIC, DRONES, 5G AND EXTENDED CONNECTIVITY IN BUSINESS /SCHOOL ADMINISTRATION

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ABSTRACT

The utilization of robotics, drones and 5G for extended connectivity in school administration at present is influencing every aspect of human life as there is an increase in automation in technology today. This article discusses the role of robotics, drones, and 5G in extending connectivity in school administration. Specifically, the study explored the role of the utilization of robotics in extending connectivity for school administration; the role of the utilization of drones in extending connectivity for schools' administration, and the role of the utilization of 5G in extending connectivity for school administration. The paper reviewed related literature to give credence to the link between robotics, drones, and 5G in extending connectivity in school administration. The study was founded on the Technology Acceptance Model, which provides a framework for understanding the determinants of technology use and acceptance in school management across various cultural settings. The result shed light on the utilization of robotics, drones, and 5G for extended connectivity across the school administration. The implementation of the recommendation, among others, to improve educational effectiveness and learning opportunities, a fundamental review of school management and educational methods should be conducted, and school administrators should consider using robotics to help students improve their computer literacy, collaborative learning, and problem-solving skills.

INTRODUCTION

The world is undergoing a period of revolutionary change (technological revolution) brought about by information and communication technologies (ICTs), which affect all sectors. As the introduction of ICTs changes workplaces, ICTs are also revolutionizing the education sector, positively influencing teaching, learning, research, management, and administration. Technological advancements in the twenty-first century have reduced the world to the size of a small global village. Despite various criticisms and sometimes incorrect applications of these technological tools or equipment, technological development has continued to change things for the better, simplifying day-to-day human activities.

The utilization of technology to build an environment where people can be motivated to work collaboratively, utilize existing information, and ultimately want to share the knowledge they produce is a vital approach to extending connectivity in today's society. (Nugroho & Mochtar, 2006). Various digital information dissemination and extended connectivity tools have been introduced over the years, changing the concept of globalization and socializing in the twenty-first century. The dissemination and retrieval of information, as well as task delegation, are now possible without borders, permitting individuals to live in different countries and interact with each other at a distance. This has been facilitated by the utilization of technological gadgets like robotics, drones, and 5G.

The support of technological facilities in the administration of businesses and schools in advanced countries of the world shows great development in socialization and standardization. Technological facilities like robotics, drones, and 5G have all contributed to easing the communication process in today's world and supported the extending connectivity of diverse users, a process that helps to facilitate business and school administration. With the application of robotics, drones, and 5G, school administrators are equipped with a variety of sophisticated tools to analyze the conditions

of their establishments, understand the requirements of their students, establish appropriate policies for enrollment, monitor and professionally manage teaching and learning activities, survey their infrastructure to overcome resource problems.

Robotics, as defined by the Merriam-Webster dictionary, is machines that perform many of the mental and physical tasks that people perform, but on a much larger scale. It is also described as a mechanical, programmable tool (as a computer) designed to perform tasks under the direction of a human operator. Robotics comes in different forms and shapes, including hand-held devices such as smartphones, tablets, and GPS devices; wearable robots (such as the bionic limbs); underwater drones; aerial drones; and sensors that are attached to vehicles or equipment. However, the main purpose of deploying robotics in business and school administration is to make work much easier, and more efficient, and to help in managing human resources.

Drones are regarded as one of the 192 major upcoming technologies which find tremendous applications in almost all areas like defence, urban planning, disaster management, healthcare, agriculture, weather forecasting, waste management, mining, telecommunications, etc. (Mahashreveta, 2018). Frey (2014) defines a drone as an Unmanned Aircraft System (UAS) which is controlled remotely either by a human operator or by an onboard computer (Nath, 2018). It can be referred to as an Unmanned Aerial Vehicle (UAV), Remote Pilot Vehicle (RPV), Uninhabited Combat Aerial Vehicle (UCAV), Organic Aerial Vehicle (OAV), Remote Pilot Aircraft (RPA), and Remote Piloted Helicopter (RPH), which can fly without a pilot and passengers on board. Its control is performed remotely by radio waves or autonomously (with a predetermined route). Its utilization in school administration entails the employment of such systems to replace manually operated flying machines, particularly in perimeter security and surveillance (Mitch., 2020).

The term "5G," which stands for the "fifth generation" of mobile telecoms technology, was first used in a technical report by the 3GPP. 5G is the most advanced generation of telecom technology because it can provide high data transmission rates and faster speeds than the existing 4G. 5G has been described by technologists as "the biggest step to date in Internet connectivity" and by the industry regulator, Ofcom, as "fundamental to the digital economy". In business and education, 5G provides a ubiquitous wireless connection that enables immersive VR content and remote instruction to provide learners with a better learning experience (Albino, et al., 2015). For example, by deploying 5G broadband tools, school administrators may be able to stream high-quality video with multiple participants or even attendees while also monitoring students' and teachers' physical conditions in real-time from multiple locations.

The usefulness and significance of technological advancement in the use of robotics, drones, and 5G brought the term "extended connectivity" to the forefront. Improved connectivity within the networked workspace and between the networked system and its connected technologies characterizes extended connectivity, particularly in school administration (Tobing, 2007). Talbot (2016) defines "extended connectivity" as "improved communication from place to place, a place to person, and person to computer," and it is required in various networks where there is no direct physical connection. Extended connectivity also has the advantage of reducing traditional workloads (because employees are not required to travel long distances) and saving money. As it addresses the need for extended connectivity in today's school administration, this paper is considered timely and essential. As a result, the paper demonstrates the enormous benefits of robotics, drones, and 5G connectivity in school administration.

OBJECTIVE

The objective of the study was to explore the role of robotics, drones, and 5G in extending the connectivity of school administration. Specifically, the objectives of the study were to:

1. Examine the role of the utilization of robotics in extending connectivity for school administration.
2. Determine the role of the utilization of drones in extending connectivity for schools' administration.

3. Ascertain the role of the utilization of 5G in extending connectivity for schools' administration.

THE CONCEPTS

Robotics

The word "robot" was introduced to the public by the Czech writer Karel Čapek in his play R.U.R. (Rossum's Universal Robots), which premiered in 1921. The word robotics was first used in print by Isaac Asimov in his science fiction short story "Liar!", published in May 1941 in Astounding Science Fiction. Asimov was unaware that he was coining the term; since the science and technology of electrical devices is electronics, he assumed robotics already referred to the science and technology of robots (Nocks, 2007). According to Wang (2010), robotics is defined as the design, construction, and application of machines (robots) to perform tasks traditionally performed by humans.

Robots are widely used in industries such as automobile manufacturing to perform simple, repetitive tasks, as well as in industries where work must be performed in hazardous environments for humans. Human operators are not required for autonomous robots to function (Zunt, 2013). These robots are typically designed to perform tasks in open environments without the need for human supervision. They are unique in that they use sensors to perceive their surroundings and then use decision-making structures (usually a computer) to take the best next step based on their data and mission. Many aspects of robotics involve artificial intelligence; robots may be equipped with human-like senses such as vision, touch, and temperature sensing. Some are even capable of making simple decisions. Today, robots are used in a wide variety of industrial settings, including chemical plants, factories, oil refineries, nuclear power plants, and mines for various purposes ranging from material handling to video surveillance and general maintenance to administrative tasks. However, according to Andrews (2018), robots are programmed to obey three laws stipulating that:

1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
2. A robot must obey orders given to it by human beings, except when such orders would conflict with the first law.
3. A robot must protect its existence, as long as such protection does not conflict with the first or second law.

Utilization of Robotics in an Educational Setting

Robots serve many purposes in an educational setting. They can serve as a model for student creations; teachers may use them to take the students through a series of simulated events, or they can be used as a tool to explore various subjects in greater depth. However, according to Chang et al. (2010), the main function of robots as teaching assistants is to accompany and encourage students to learn, and the key purpose of a teaching assistant is to help instructors present materials. The role of robots in the teaching process might be in a storytelling mode, an oral reading mode, a cheerleader mode, an action command mode, or a question-and-answer mode (Duffy, 2016). For instance, in the mode of storytelling, a robot is more than meets the eye or meets the ear; it can also nominate alternative voices, sound effects, or comic actions, all of which enrich the interaction and learning environment for both participants.

Utilization of Robotics in School Administration

In business administration, robotics is now being used to contribute to business administration by facilitating better and faster services like trading and logistics, data mining and interpretation, cloud computing, and inbound contact centres, while in the school environment, in advanced countries, robots have been able to fill the primary roles of secretaries, custodians, and cleaners in schools. Therefore, the role that robots can play in aiding the administration of schools includes

the following: (1) task scheduling and management; (2) entry recording (3) managing student data; (4) assisting teachers with the areas of planning and preparation; research activities and administration; (5) analytics and decision making; (6) preparing data and distributing it to teachers and other staff; (7) analyzing student performance; (8) doing clerical work like answering telephone calls, or fetching colleagues in the building at the request of these teachers and others; (9) guiding students; conducting competitions in classrooms and teaching activities; among others (Pinto, 2003).

Utilization of Robotics in Extending Connectivity by School Administrators

In school administrative functions, the use of robots can facilitate the sharing of ideas, tools, and work amongst school administrators by automating some of the routine and manual tasks that are commonly done by teachers to manage their time and reduce their workload. Thus, connectivity through automation and robotics helps teachers to facilitate information sharing among the administrators. According to Kolodny (2017), robotic technologies "can facilitate increased connection and communication between teachers and administrators." Allowing the exchange of information, allows administrators to be more proactive and take greater control of their schools. Therefore, to enhance extended connectivity that promotes better decision-making, the automated connections among administrators will help improve collaboration and maximize administrative control.

Drone

A drone is an unmanned aircraft or ship guided by remote control or onboard computers. It can also be seen as a flying robot that can be remotely controlled or fly autonomously through software control. The history of drones can be dated back to the era when men were always on the battleground, fighting wars with guns, long spears, armoured on horses, covered from the tips of their toes to their heads, all in a bit not to be vulnerable to the adversaries of wars (Chim, 2017). The quest to enable man not to be exposed to the danger of casualty in a war situation has been at the forefront of thought, letting their weapons do the battle on their own and retaining man alive. The original reason for building drones was for military purposes, especially as weapons in the form of aerial missiles guided by remote control through radio waves, but today, drones have found a wide range of applications for civil use in the form of small quad-copters and octocopters, which are used for numerous functions such as monitoring climate change and delivering goods, carrying out search operations after natural disasters, and filming and photography.

According to Haowei (2017), a drone has a vast and growing set of applications, the simplest of which is for cinematography, with various drones capable of filming and documenting different aspects of a particular place. In a school environment, drones can be used to account for all the students and staff's attendance as an effective way of increasing student attendance at school, as well as reducing absenteeism and truancy. It can help to reduce truancy because the students and teachers can easily track a student's location, making it easier to prevent or discourage them from misbehaving at school.

Utilization of Drones in an Educational Setting

Drones are not primarily intended to aid in teaching and learning. However, it can be viewed as an effective resource for engaging students in the learning process. According to Carnahan et al. (2016), incorporating drones into instructional activities boosts student motivation and engagement. In Thailand, for example, a study of distance education students found that "drones not only increased positive student engagement but also reinforced students' knowledge." Drones have proven to be beneficial to both teachers and students. The use of drones in instructional activities will increase learners' interest in their classes and engagement with learning.

Utilization of drones in school administration

Drones' roles in business and school administration include package delivery, using artificial intelligence to aid in surveillance and real-time crime solving, supervising student behaviour while they are on the playground or at their computers (Knutson, 2007), and teaching through remote robotic tutoring. However, for administrative purposes, drones can; (1) conduct inspections of schools easily to ensure the educational environment is safe for students and staff; (2) help to make delivery processes of school provision efficient, timely, and economical by ensuring the supplies and equipment ordered for a school are delivered on time to avoid delays; (3) help monitor the smooth running of a school environment through its security cameras, which helps to improve students' morale; and (4) help to keep up-to-date voice recordings and video footage that can be used to review any incidents that might have occurred, for remedial purposes, or evidence in the event of a complaint made against a school (Mahashreveta, 2018).

Utilization of drones in extending connectivity by school administrators

In school administrative functions, the use of drones can facilitate the sharing of communication such as surveillance information between the metropolitan level, head teachers and their administrative bodies. The utilization of drones in school administration as a tool to disseminate news, aerial photography, and sensor platforms that can assist educational institutions in developing standards, compliance guidelines, and audits. Therefore, with the high rate of insecurity and the need to keep both human and material resources safe, the use of drones can be used as a tool in school administration to ensure safety and security.

5G

The fifth-generation networks, simply known as 5G networks, form the core of our online existence. By definition, 5G refers to fifth-generation cellular network technology, which will eventually deliver faster and higher speeds than 4G networks. 5G is expected to significantly enhance the mobile network, enabling more connections and interactions (Akyildiz, et al., 2014). This connectivity enhancement across networks will unlock significant potential for various industries to improve their bottom lines. 5G networks will connect classrooms with remote learning resources for the education industry, allowing teachers to assist students from anywhere in the world. For example, the extensive 5G coverage has the potential to power an increasing number of online and hybrid learning programs, allowing university labs and study groups to convene and communicate in video-rich environments. Traditional educational patterns have shifted dramatically as a result of the influence of personal computers and the Internet. Diverse online learning resources and online schools are now on the rise. As an IT infrastructure, 5G has enormous potential to promote further innovation in educational applications. Unlike traditional classroom technology, 5G can support faster communication and the transmission of large amounts of data at high speeds and with low latency (Amaral et al., 2016).

According to Attaran (2017), 5G technology, with the Internet of Things (IoT), and virtual/augmented reality (VR/AR) technology, allows learners to have similar experiences to be present in real classrooms at any time or place. High-quality learning environments abound, authoritative education experts are always available, and high-quality learning interactions are vibrant. We conducted research on 5G technology when applied to the field of education, with a particular focus on the innovation of application scenarios and the potential reconstruction of educational main processes, to effectively track the trends of 5G technologies as coupled with educational applications.

Utilization of 5G in an Educational Setting

For the infrastructural functions of information and communication technology to be utilized in the informatization of the educational system, certain improvements in the basic design and structure of e-learning environments will be required. Due to its shortcomings in networking convenience, network delay, security management, terminal cost, and so on, the existing network's access

means, such as fixed broadband, WiFi, and 3G/4G mobile network, make it difficult to meet innovative application scenarios for education and teaching such as high definition (HD) live broadcasts, VR/AR teaching, holographic classrooms, HD supervision, and so on (Barreto et al., 2016). For example, the existing 4G educational cloud application can essentially meet the requirements of a single channel's full HD (1080p) educational video content collection and transmission, but it cannot meet the requirements of a multi-simultaneous channel's full HD video return, as well as the return and two-way interaction of higher quality teaching resources such as a UHD video or even a VR panoramic video. There is a vast interactive space in the application demand for educational innovations and new IT capabilities, and the adoption of 5G networks, when precisely adapted and deeply integrated, is expected to solve the challenges faced by the existing educational network.

Utilization of 5G in school administration

For administrative and management purposes, the use of 5G technology provides school administrators with the business advantages of the 5G network through hardware terminals to solve the actual educational needs of campus users and bring better education experiences by: (1) unifying network bearing, so schools no longer need to deploy multiple networks; (2) using an ultra-high network bandwidth, which means that the interactive display of terminal equipment, transmission sign, and so on can all be done at the same time; (3) faster speed and lower delay, to support normal recording and broadcasting of intelligent classrooms, and remote conference rooms for remote teaching can sense and experience the classroom environment of "top teachers and excellent courses" without delay; and (4) supporting new application scenarios of education and teaching such as game-based courses, VR experimental environments, VR controlled environments, HD stereoscopic displays, remote examination monitoring, and so on (Bhalla & Bhalla, 2010).

Utilization of drones in extending connectivity by school administrators

In school administrative functions, 5G technology is used to transmit the results of statistical analysis of various behaviours back to teachers and the school management system in real-time, allowing teachers and teaching management to interact in real-time. However, the possibility of the potential risks and threats posed by AI technology in educational applications, such as the leak of students' private information, the ethical risks of abusing technology, and so on, cannot be ignored (Blanco et al., 2017).

The potential benefits of 5G-enabled AI's technological application in extending connectivity in educational fields are worth considering. Thus, 5G enables the effective transmission of 4K videos to classrooms, which has opened up the possibility of intelligent applications in improving class education, according to Blanco et al. (2017) could be: (1) in the increased value of deep data mining, which is digitized from teaching and learning processes and can be used in supervised and personalized instruction; (2) by automatically analyzing homework, photos, and texts uploaded by students, automatically correlating important and difficult content, and providing more opportunities for independent learning; (3) in the process of individual learning by making knowledge maps and learning plans according to the correlation of knowledge points; and (4) by accurately judging the level of students, providing suitable learning plans, and providing personalized guidance schemes.

THEORETICAL FRAMEWORK

The Theory of Technology Acceptance Model (TAM)

The possible adoption of robotics, drones, and 5G for extended connectivity in school administration is explained through the use of the Technology Acceptance Model (TAM) by Davis (1989). The model suggests that when users are presented with new technology, several factors influence their decision about how and when they will use it. These factors are perceived

usefulness, defined as the degree to which a person believes that using a particular system would enhance his or her job performance, and perceived ease of use, defined as the degree to which a person believes that using a particular system would be free from effort (Davis, 1989 cited in Sanzogni et al., 2010). These three factors are considered to be the primary determinants for adopting and using new technology and are influenced by other variables such as security concerns, cost, convenience, and satisfaction (Sanzogni et al., 2010).

The Technology Acceptance Model (TAM) is a prominent theory that seeks to investigate the attributes that influence technology adoption. Ducey (2013) also described it as a parsimonious theory of technology adoption in an establishment, which intends that individual responses toward technology can trigger intentions or curiosity to use the technology, which in due course can influence actual usage.

Concerning the present study on robotics, drones, and 5G for extended connectivity in school administration, TAM can be used to better understand technology acceptance. Based on the TAM, for school administrators to adopt robotics, drones, and 5G for extended connectivity, they need to find out (1) the perceived benefits of the technology from their perspective; (2) how comfortable users are with the technology; and (3) the cost related to the usage of the technology, before they adopt it. Therefore, TAM was chosen as the appropriate model for this study, and based on this, the conditions for adopting robotics, drones, and 5G for extended connectivity in school administration can be explained.

CONCLUSION

School administration in the twenty-first century is changing faster than ever before, which has contributed significantly to the rise in teen suicide rates. The use of robotics, drones and 5G for extended connectivity in school administration has been lauded as a means to improve accessibility and productivity, but it comes at the expense of human contact and meaningful learning. The benefits extend not only to learning support but also to school administration, particularly discipline management, security management, and social interactions between students and teachers.

The rise in challenges in today's schools has fueled the deployment of drones in schools for use in monitoring security systems and providing administrative support services. Furthermore, the use of robotics has contributed to redefining the concept of learning and education in modern times, while 5G promises to provide students with increased connectivity while also increasing educational effectiveness by providing real-time feedback and guidance, opening up previously unavailable learning opportunities. From an administrative standpoint, if 5G is successful in the way it was intended to be, and it is, a more efficient school management system may emerge. These can improve the administration's extended connectivity to the information processing, intelligence, automation, and manipulation capabilities that result from this type of deployment.

RECOMMENDATION

Based on the discussion of the study, the following recommendations are proffered:

1. To improve educational effectiveness and learning opportunities, a fundamental review of school management and educational methods should be conducted.
2. School administrators should consider using robotics to help students improve their computer literacy, collaborative learning, and problem-solving skills.
3. To improve educational effectiveness and learning opportunities, school administrators should consider using drones for school surveillance, safety, productivity, and connectivity.
4. School administrators should think about deploying 5G networks in education to improve wireless communication and immersive learning opportunities.

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