



# Technological acceptance of the Internet of things (IOT) In Egyptian schools

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## Abstract

The study aimed to identify the motives of teachers to use the Internet of Things in the educational process, as well as to identify the acceptance of high school pupils in using this technology in the educational process, and revealing the obstacles facing them. During its use, the researcher used a survey form (with 14 items), and a questionnaire (with 10 items). The following statistical methods were followed by frequency, percentage, and arithmetic mean of analyzing the results of the questionnaires. The importance of this study lies in being the first one in that field in Egypt (according to the researcher knowledge), in addition to providing decision makers, and the responsible for the educational process with basic information related to the effectiveness of the use of modern technology in education, then developing the educational process in line with modern technologies, and the requirements of the modern era. This study came out with a set of results, the most important of which are that teachers have positive motivations for using it in educational process. Students also can accept use the Internet of Things in the educational process, as it facilitates students' understanding process and helps them communicate with each other. Students also considered using the Internet of Things in education easy and fun for them, but one of the most important obstacles was poorly qualified infrastructure.

**Keywords:** *technological acceptance, Internet of Things, Egyptian schools*

## Introduction

With the development of the Internet and the emergence of the fifth generation networks, the applications of the Internet of Things have emerged, which led to drastic changes in all institutions, including educational institutions, and a new form of services appeared, and Egyptian universities began under the guidance of the Supreme Council of Universities, the establishment of departments for artificial intelligence and the Internet of things (El-Dahshan, 2019).

In the Faculty of Engineering, Alexandria University, the use of the Internet of Things for administration of the university was started with the aim of transforming it into a smart university and applying the idea of a smart building and classroom using cameras connected to the Internet to record attendance and follow-up of students' reactions inside the classroom, and locate unused classrooms, and obtain a report on the extent of

exploitation of the places, and university laboratories (El-Dahshan, 2019).

The Ministry of Education in Egypt recently launched my classroom initiative that aims to bring about a radical transformation in the educational process by applying the concept of smart classes throughout the Arab Republic of Egypt. An agreement has been signed with the company Net Dragon to build 265 thousand smart semesters in All over the country for the next three years (Magdy, 2019),(Zayed, 2019).

Internet Of Things (IOT) is a new technology that enables the teacher to manage and control the educational process in an easy and effective way, closely and remotely, and relies primarily on the scenario of interacting things across the Internet to provide better services to humans, and smart classes based on the Internet of Educational Things cross from The most prominent educational applications of this technology and the concept of smart classes means an intellectual environment equipped with advanced

educational methods based on the latest technologies or smart things (Gul, et al, 2017).

According to (Alandjani, et al, 2018) the smart object provides ease and comfort for class management, and helps provide a better educational environment, the Internet of Things can be considered a new way to manage classrooms using advanced tools, which help in facilitating tasks and removing barriers, And the road ahead is still a difficult and long way for the Internet of Things initiative to achieve more transformations in educational institutions, and these are some tools commonly used in the classroom (Gul, et al, 2017): Smart whiteboards, Tablets and Mobile devices, e-books, 3D Printers, Student ID Cards, Temperature Sensors, Security Cameras and Video, Room Temperature Sensors, Electric Lighting and Maintenance, Smart HVAC systems, Attendance Tracking Systems, Wireless door locks.

The Ministry of Education in the Arab Republic of Egypt is currently working to keep pace with technological changes in this era, so only the trend has begun towards employing some of these modern technologies in the educational process, the most prominent of which are: the experience of tablets, smart boards, and multi-touch panels, which have become an integral part of the classes Study in some Egyptians schools, and it was started to prepare interactive digital content for the secondary levels, so that the student can download the e-book from the official website of the ministry and start the learning experience, and this book is not an ordinary electronic book, but rather an interactive book and a virtual lab, the student can click on the links to view the videos, drag and drop Some symbols for conducting scientific experiments, and it also allows more than one pupil to interact with the content at the same time, thus, pupils can be partners in the virtual lab (Ali, 2019).

This is in addition to the presence of smart wearable devices such as Google glasses and smart contact lenses, which enable the student to view digital books as a direct broadcast in front of him. Virtual Reality (VR) can summarize hundreds of textbooks in a one-hour live experience however, wearable devices are still an expensive option for local schools, so virtual reality applications that require smartphones only appeared as the application of (Al-Takhtah) which uses technology to integrate education and curricula with entertainment through games, pictures and 3D (Ali, 2019).

Although employment of The Internet of Things in education is still vague and unclear, many studies and research indicate that Internet of Things technologies have an important impact in the field of education, as many studies have indicated as a study (Banica, 2017) to the importance of employing the Internet of Things in higher education as a new way to remove all barriers to education, such as geographical location, geography, language, and economic status, but there are as yet no models or criteria for its widespread use, moreover, universities are not ready to accept all The changes proposed by the Internet of Things in Education sector. And a study (Pruet, 2015) aimed at employing Internet of

Things techniques to develop the educational process in primary schools in rural communities in northern Thailand. The results showed that IOT technologies helped provide a personal, rich and interactive learning environment, anytime and anywhere, and also made the learning process more active, through collaborative participation outside the classroom. While the study of (Mershad, 2018) indicated that the Internet of Things improves the management of the educational institution, provides the teacher with various teaching methods, and contributes to improving the process of explaining different concepts by linking the concept with virtual reality technology.

In addition to, the study (Al-Aklabi, 2017) which presented the most important advantages and benefits of the Internet of Things, especially in the educational information environment, and the study indicated that the student's behavior towards the Internet of things is determined by the student's view of this technology, the more he viewed it as easy and uncomplicated, the greater its demand for it and will get better results. the study also indicated that most students are concerned about espionage, hacking and breaches of privacy. The results of the study (Al-Harbi, 2019) indicated that the Internet of Things facilitates the process of monitoring female students' attendance and monitoring absences, and is useful in determining the location of the student, whether in or outside the class.

## Methodology

According to the results of these studies, and what they have indicated, and as a result, the lack of studies on this topic in relation to its importance in the Arab world, especially in Egypt, where no similar study has been carried out on this topic until now, the researcher believes that conducting such a study has become an urgent need, so this study aimed to Identify the motivation of teachers, and the extent of their qualification to use these innovative techniques in the educational process and revealing the problems that face them as a cornerstone in the entire educational building and the primary engine in the educational system, as well as the study aimed to reveal the extent of acceptance of secondary stage pupils to use these technologies, and the difficulties they face, and from Here, the research problem clarified the technological acceptance of the Internet of Things in Egyptian schools. The research problem can be formulated in the following questions:

- What are the motives of teachers to use the Internet of Things in the educational process?
- How qualified are teachers for teaching IOT devices and technologies?
- What is the extent of acceptance of secondary school students to use the Internet of Things in the educational process?
- What are the obstacles to employ the Internet of things in the educational process?

**Model of the Study:** This study was a research using the survey form. The opinions of linguists, field experts, and assessment experts were used in preparing the research questions.

**Sample Group:** It included (50) teachers, in addition to (100) students in the secondary school, the first semester of the year 2019-2020, they were randomly chosen from (5) different international schools interested in applying the new education system in the Zamalek district and engineers in Cairo.

**Data collection, and data collection tools:** In this study, a teacher questionnaire was used, and a student questionnaire was prepared by the researcher. The questionnaires prepared by a specialist in the educational technology were examined and completed in the direction of the recommended reviews. The questionnaires included demographic variables and five-point Likert elements on the use of the Internet of Things in education.

**Data Analysis:** The questionnaire for teachers consists of (14) items, and the questionnaire for students consists of (10) items. Response scores were distributed on these questionnaires according to the Likert quintet measure as shown in the following table:

Table (1). Score ranges made with scale options

Options	Points Given	Score Interval
I completely agree	5	4.20-5.00
I agree	4	3.40-4.19
I partly agree	3	2.60-3.39
I disagree	2	1.80-2.59
I completely disagree	1	1.00-1.79

Statistical analysis of the data obtained was performed using a packed program. Statistical methods such as frequency, percentage, and arithmetic mean were used in the analysis process. The data was encoded by the researcher

## Results

The following tables show the number of individuals in the sample, teachers and students, according to their choice of those who strongly agree, agree, and are not sure, do not agree, and do not agree at all. The tables also show the arrangement of each paragraph in descending order according to the scores of the arithmetic average:-

**Table (2-a). Results of evaluating teachers' motives for using the IOT in the educational process**

Item No.	ITEM	Mean	Level
1	IOT provides a variety of teaching methods that suit individual differences among students.	4.42	very high
2	IOT helps clarify the different concepts for students by simulating reality.	4.38	very high
3	IOT saves the time and effort of the teacher by quickly and accurately tracking students, monitoring their attendance, and receiving homework	4.36	very high

Item No.	ITEM	Mean	Level
4	IOT enhances the student's relevance to the teacher through the direct communication features available through smart classrooms and e-learning applications.	4.34	very high
5	Use IOT in education improves the management of the physical and structural environment of the educational institution.	4.26	very high
6	IOT automates the learning process, helps to track student level of achievement and supports militants easily.	3.98	High

The results of the arithmetic mean for table (2-a) show that the arithmetic mean for all items ranges from (4.42) - (3.98). Therefore, we can say that sample members have positive motives with a very high degree towards the use of the Internet of Things in the educational process, especially in the teaching aspect, where the first and second item topped the table. On a question: What are your motives and other advantages? The teachers' sample did not indicate any other motives for using the Internet of Things in the educational process.

**Table (2-b). Evaluating the extent of qualification and readiness of teachers to use IOT in the educational process.**

Item No.	ITEM	Mean	Level
7	The training provided by the Ministry of Education helped me to use modern technology effectively.	4.3	very high
8	I need extensive courses to deal with IOT technologies.	3.84	High
9	I can help my colleagues who have no experience dealing with technology.	3.68	High
10	Resort to technical support when any technical malfunction occurs even if it is simple.	3.28	middle

The results of the arithmetic mean for table (2-b) show there is still a class of teachers that need more training and qualification to deal with that modern technology to be able to respond and harmonize with the requirements of the current era, and it can employ this modern technology in the field of teaching, as item (8) At the highest arithmetic average, which indicates there are still deficiencies in training and qualification of teachers to use these emerging technologies

**Table (3). Assessment of the student's degree of acceptance to use IOT in the educational process**

Item No.	ITEM	Mean	Level
1	IOT displays study materials in easy and innovative ways that helps increase my understanding and achievement.	4.36	very high
2	IOT increases the interaction between me and my teacher.	4.27	very high
3	IOT provides new ways for sharing, communication and cooperation between I and my colleagues.	4.05	high
4	Learning via IOT is easy and fun.	3.86	high
5	IOT helps reduce the school load and	3.68	high

	organizes learning times effectively.		
6	IOT reduces my dependence on private lessons and helpful books.	3.54	high

The results of the arithmetic mean for table (3) show that the arithmetic mean of all items ranges between (4.36) - (3.54), so, we can say that sample members have a high desire to use the Internet of Things in the educational process and keep pace with the digital age. As for the question of other motivations that encourage students to use the Internet of Things devices and applications in the educational process, the sample mentioned a number of motives: such as keeping pace with the technical age, simplifying complex matters, general awareness, increasing culture, diversifying methods of explaining school curricula, saving time and effort, increasing motivation to learn, and learning from anywhere and at any time, in addition to the entertainment side.

**Table (4). The obstacles to using IOT in the educational process for the teacher and the student**

Item No.	ITEM	Mean	Level
1	Sudden weakness in the Internet, or frequent interruptions at times is the biggest barrier to using IOT.	4.03	high
2	I am experiencing difficulties when using some IOT devices and technologies that make me lose confidence in myself, and I refrain from using it.	3.91	high
3	Fear of technical problems and malfunctions while using this technique.	3.41	high
4	Using the IOT makes me vulnerable to digital threats, such as breach of privacy, hacking, and spying.	2.88	middle

The results of the arithmetic mean for table (4) show all sample members had obstacles in using the Internet of Things in the educational process, and the results of item (2) indicate that there is not enough experience to deal with the Internet of things, which constitutes an obstacle to its use, and this result is consistent with the previous questionnaire that teachers are still Need training. As for a question: What are the other obstacles that you see stand on the way of using the Internet of Things in the educational process? The members of the sample mentioned some reasons: such as poor budget, lack of desire among some to apply it, and the inadequacy of some courses to teach with this modern technology.

## Discussion

The results of the study indicate that one of the most important motivations of teachers to use the Internet of Things in the educational process is that it provides different and diverse teaching methods that suit individual differences between students. Furthermore, it helps in clarifying the different concepts of students through virtual reality technology in addition to save the time and effort of the teacher through speed and accuracy in tracking students and monitoring their attendance, and

receiving homework and assignments from them. The results of the study also show there is an acceptance among high school students to use the Internet of Things in the educational process, as the sample agreed that using the Internet of Things is easy and enjoyable, and help in absorbing and understanding the course better; by diversifying the strategies, and methodologies used in the explanation.

As for the obstacles to use the Internet of Things in the educational process, the sample — teachers and students — indicated there are administrative obstacles such as poor planning, organization and supervision, human obstacles such as intellectual beliefs, lack of competence and experience, technical and technical obstacles such as the weakness of the Internet, and financial obstacles such as a lack of budget.

In this current study, the results of the current study were in agreement with most of the results of previous studies that were referred to in this research.

## Recommendations

Based on the findings of the study, the researcher recommends the use of the Internet of Things in schools and universities, and work to cope with this ongoing change, which has become an imperative.

In addition to, start the rehabilitation of teachers and hold training course for them, considering the teacher the most important elements of the educational system, and its failure leads to the failure of the entire system, and that the training of good teachers It can contribute to transferring and helping learners to use the Internet of Things better.

The researcher also recommends conducting more researched to identify the difficulties that hinder the use of this emerging technology in the Egyptian education environment and find appropriate solutions to it.

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