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Employing Cloud Technologies in E-Learning Systems: University Students and Teachers' Ability in Storing Information in "Cloud": A "Google Classroom" Study

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Abstract:

E-learning today has a significant impact on learning, due to its ease of accessibility and the fact that it does not take into account geography, politics, or narrow economic interests. This significance gains a special status, especially when having doubts regarding the possibility of a final settlement of the pandemic Coved-19 in a short period. Education using digital technologies allows students to expand their access to knowledge resources and to special skills which support the curriculum, as well as carrying using important features such as continuous assessments that enable them to advance in the field of research and to develop their ideas, and perhaps provide more opportunities to extend their knowledge and stimulate critical thinking that is formed by allowing students to gain knowledge and reach conclusions by themselves. With the spread of this huge number of smartphones, also of the availability of internet service at any time and place allows digital services to go beyond many boundaries to share information. "Cloud" computing technology provides optimal solutions for setting an effective infrastructure that allows researchers, teachers, and students to access services from anywhere and by using any kind of digital devices connected to the Internet to get valuable resources and services and to take advantage of the capabilities and functions provided by these modern environments. This contributes to providing the tools for supporting learning, teaching, and cooperative work. "Cloud" computing gives students and teachers a more convenient and effective learning experience.

Keywords: Cloud Computing, Teachers, Student, Smartphones, Education, Applications.

توظيف تقنيات السحابة فى أنظمة التعلم الإلكترونى: قدرة الطلاب والمعلمين الجامعيين على تخزين المعلومات فى "السحابة": دراسة الكوكل كلاس روم

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الخلاصة

يؤثر التعلم الإلكتروني اليوم بشكل كبير على التعلم نظرًا لسهولة الوصول إليه أنه لا يأخذ في الاعتبار الجغرافية أو السياسة أو المصالح الاقتصادية الضيقة تكتسب هذه الأهميته عند وجود شكوك بشأن إمكانية العلاج نهائية لوباء كوفيد −19 في فترة قصيرة.

يسمح التعليم باستخدام التقنيات الرقمية للطلاب بتوسيع وصولهم إلى موارد المعرفة والمهارات الخاصة التي تدعم المنهج، اضافة إلى استخدام ميزات مهمة مثل التقييمات المستمرة التي تمكنهم من التقدم في مجال البحث وتطوير أفكارهم ، و ربما توفر المزيد من الفرص لتوسيع معارفهم وتحفيز التفكير النقدي الذي يتكون من خلال السماح للطلاب باكتساب المعرفة والتوصل إلى استنتاجات بأنفسهم. يعتقد العديد من الخبراء أن هذه الفترة المتمثلة في تبني وتجريب أساليب ومنهجيات مختلفة في التعلم الإلكتروني ستسرع من تبني وتكييف التعلم عبر الإنترنت وغيره من أشكال التعلم القائم على التكنولوجيا بعد الأزمة يكتسب هذا أهمية خاصة حيث أنه من المهم للغاية التغلب على العقبات الفنية والعملية المتعلقة بثقافة استدخامها من قبل الطلاب و الاساتذة. استفادت العملية التعليمية من التطور التكنولوجي باستخدام أدوات تكنولوجية مختلفة لنقل المعرفة ونقلها إلى المستفيدين باستخدام عدة طرق. توفر تقنية الحوسبة "السحابية" الحلول المثلى لإعداد بنية أساسية فعالة تسمح للباحثين والمعلمين والطلاب بالوصول إلى الخدمات من أي مكان وباستخدام أي نوع من الأجهزة الرقمية المتصلة بالإنترنت للحصول على موارد وخدمات قيمة والاستفادة من القدرات والوظائف التي توفرها هذه البيئات الحديثة. وهذا يساهم في توفير الأدوات اللازمة لدعم التعلم والتعليم والعمل التعاوني. تمنح الحوسبة "السحابية" الطلاب والمعلمين تجربة تعليمية أكثر ملاءمة وفعالية. كما أنه يحتفظ بكل شيء مثل سجلات الفصل، والواجبات، والحضور ، والمناهج، يمكن للأشخاص ذوي الامتيازات الوصول إليها.

الكلمات المفتاحية: الحوسبة السحابية, التدريسيين, الهواتف الذكية, التربية, التطبيقات

1.Introduction

We have a generation of students with a high level of digital culture and technology awareness, which makes teachers in need of developing themselves and trace the latest developments in the field of technology and modern applications in order to keep up to date. The teacher can find educational applications or design one of them through one of the companies specialized in the field of application design, and deploy it on different digital platforms and offer interactive scientific content that attracts their students and creates channels between them and the students. By creating his/her own educational application, the teacher can use some advanced technologies to present information in a modern way and use many advanced tools and mechanisms to support a presentation of his scientific subject in a fun way by inserting some attractive images and videos and then sharing them with students. The teacher can also through his own applications record more details about scientific content in the videos and share it with students to get benefit from them for a longer time and get the highest rate of benefit and consider it as a reference for the student whenever they want to check it. The teacher can also replace the student's physical notebook and documents with digital ones in addition to saving their academic scores, send direct message or exam results to specific students or their parents at the same time. The teacher can activate one of the advanced features in his application which enables him to communicating without showing his identity. Mathematics teachers in specific can get the most benefit from such applications as the application can help them to store many complex mathematical equations and rules and then easily retrieve them when needed. One of the best experiences that teachers can get from application design is using it during the time of the exams. The application will allow teachers to prepare more than one sample for the exam and provide many innovative ideas and take notes that help the teacher later in assessing the level of the student accurately.

1-1- Statement of the Problem:

Due to the importance of the technology of mobile, tablets and the huge spread of it and its high technical advantages, it must be used, utilized and integrated in the educational process in the best possible way.

Despite the many positive aspects of using smart phones, they have several negative effects on the lives of university students especially if they are used and overused for non-educational purposes. The results of this study help university students use smart phones in the right way. This study helps students to increase their knowledge of the importance of smart phones and how to get benefit from it. This study helps the students how to use smart phones in education. The study is the first one in dealing with the standards for the use of smart phones.

1-2- Research Importance and Objectives:

At the beginning of 2020, and with the emergence of the Virus Covid-19, it became urgent to pay attention to non-traditional methods in education such as using e-learning. Hence, companies started developing platforms in order to be more practical and to gain a better understanding of education and the reality of education. In the research, we attempt to know the most important educational platforms in the world and the benefit of each one.

We believe that Google Classroom is one of the most secure platforms for Iraqi universities, and the most secure in terms of confidentiality. It develops daily through a large group of programmers and university professors specialized in the field of education and psychology.

“Cloud” computing has great benefits when applied in cooperation with e-learning, because it helps to:

- Improve computer hardware performance and lower maintenance and infrastructure costs as well as software costs.
- increase computing power and improve compatibility between operating systems, as well as increase data security and document transfer, and facilitate cooperative teamwork.

1-3-The Importance of The Study:

This environment enables users to focus on creating interactive content like files, videos, and audios instead of routine maintenance for devices, as it reduces the chances of files being lost in devices, and gives the user great capabilities and tools to work and collaborate anywhere and at any time and from any device. In addition to that, it helps to improve the work and increase performance, as it facilitates information technology cloud for individuals to collaborate in a flexible way without time and place limitations or restrictions.

“Cloud” computing has also an advantage that is not found in personal computers which is collaboration. Resources in “Cloud” can be accessed and shared from anywhere, you just need to connect to the Internet. “Cloud” computing is also easy to use. Many educational institutions around

the world have confirmed that "Cloud" computing is a very attractive system for use and so much useful when integrated in the educational process.

1-4-Purpose of the study:

The study aims to measure the usage of Cloud technology in education by students and teachers, especially when using smart phones. For this purpose and to achieve this goal, the following questions have been asked: How much do students and teachers use smartphones in education? How are they using smartphones in education and in the learning process?

2. Methodology

2-1- Literature Review:

In their study, Zuhal İNCE, Volkan Alparslan KILIÇ (2016) seek to determine the habits of using smartphones among young users and to determine their addiction to smartphones. Their sample consists of 759 students in the 2015-2016 school years from Corves High Vocational School who is selected as a study sample using the simple random sampling method. According to the research results, 71% of students use smart types of mobile phones. Additionally, 59% of the students use their phones' internet. 50% of the students say they check their cellphones every 15 minutes at least. Moreover, 41% of the students that they check their cellphones at least once every half an hour. According to the results of the experimental method, students are assessed to have less movement and less educational achievement on the days when they use their phones.

Tuncy Ercane (2010) mentions that "Cloud" computing has become the computing technology for many organizations for its dynamic scalability and the use of virtual resources as an online service. It has a major impact on the educational environment in the future. "Cloud" computing is an excellent alternative for educational institutions that are particularly budget-deficient in order to operate their information systems effectively without spending more cost for computers and network devices. Universities take advantage of the cloud-based applications provided by service providers and enable users to perform business and academic assignments. In this paper, we will review what the "Cloud" computing infrastructure provides in the educational field, especially in universities and what can be done to increase the benefits of popular applications for students and teachers.

In another study by Tomasz Lisa, and Bajdor Paulab (2015), "Cloud" computing is usually associated with a set of applications and tools companies use to conduct their business. However, the possibilities provided by "Cloud" with its versatility make its tools and applications usable in education. There are many articles and papers outlining the benefits that the "Cloud" application provides and its use by universities. However, none of these studies has raised the issue of using "Cloud" by students, who are the backbone of any university. Therefore, the aim of this research is to present not only the possibilities that "Cloud" offers in education, but also how students perceive "Cloud" computing, and whether they are considering introducing it into universities.

Zuhrieh Shana, and. E, S. Abulibde (2017), examine the readiness and basis of adopting "Cloud" computing for higher education in the United Arab Emirates using the acceptance theory model and structural equation modeling. After introducing the concept of "Cloud" computing through the

educational technology course, experimental data were obtained from an online questionnaire of 239 male and female undergraduate teachers. The tested hypotheses are about user acceptance and "Cloud" computing certification. The results reveal that the perceived ease of use affects the intention to use the technology in the future, and show the intention to use it in the actual use of teachers. Study results provide educational institutions and "Cloud" service providers with a better understanding of "Cloud" computing certification issues. It also supports the foundation for upcoming research that focuses on improving our awareness of technology adoption and the factors of continued use of innovation in educational technologies. Archeology is discussed in the context of education.

2-2- Cloud Computing:

It is a term that refers to computer resources and systems available on demand via the network, which can provide a number of integrated computer services without being restricted to local resources for the purpose of facilitating the user. These resources include space for data storage, backup and synchronization, as well as program processing capabilities and scheduling of tasks and e-mail payment and remote printing. When the user is connected to the network, the user can control these resources through an easy programming interface that facilitates and ignores many details and internal operations.

Advantages of Cloud Computing:

Low cost:

There is no need to invest in servers, data centers, nor the technology workforce needed to operate the service. You only pay for the cloud computing resources that you have used. The most important economic benefit is that the cost varies with usage, and the overall usage is less than any other method currently available.

Faster services:

With cloud computing, developments in the IT field are just a click away which means that the services are fast. In other words, the time needed to get to the latest technologies can be reduced to just minutes. This point also helps to speed up the tasks required by institutions that rely heavily on the availability of the Internet, as the time required to test and develop tasks is less than any other method available.

Flexibility:

You don't have to worry about the site's infrastructure space before you actually start working on it. When you make a space decision before launching a site, application, or online store, you will get one of two results, either with additional space or a decrease. Whereas when you use "Cloud" computing, you will get rid of this problem as you will be able to gain access to enough space for your field with the possibility of increasing or reducing the space as needed.

Environment friendly:

Cloud-based business areas use only the space they need, which reduces their carbon footprint. Using cloud services saves 31% of the energy and carbon emissions that conventional servers use. Once again, small and medium-sized companies are the biggest winners, energy savings and carbon emissions reach 90%.

Smartphone:

Mobiles or smart devices allow users to make voice calls, send text messages, browse the Internet, and run many basic programs that run on computers. It is also worth noting that smartphones use the touch screen to interact with users. Many applications and programs such as personal applications, games, and special programs used at work, and the first unofficial smartphone was developed in 1992 by (IBM). In 1994 AD made an improved version known as (Simon Personal Communicator). Using the mobile phone and adopting it as an educational tool in the educational process in many schools and universities help students follow their academic courses, duties, lecture, and achievement grades, as well as various administrative follow-up decisions of academic instructions in various colleges and departments, save time and effort and facilitate the process of technical communication between all sides of the educational process. Also, the use of the smartphone in the educational process is in line with the recent trends in the field of communication technology and its use in the educational process, where the smartphone plays an important role in education and teaching in light of the information society. Moreover, such devices help to achieve a type of direct communication between the parties of the educational process, the student, the educational institution and the parents and work to facilitate the tasks of teachers in addition to the important role that can be played in training them to use it in the educational situation.

2-3-1 Smartphone operating systems:

Mobile OS is a system that run on smartphones, tablets, personal digital assistants and other mobile devices. Mobile operating system is a program that acts as a platform through which programs (applications) operate on mobile phones. Modern mobile phone operating systems combine the features of personal computer operating systems with other additional features, including touch screen, mobile network, Bluetooth and Wi-Fi, GPS, camera, speech recognition, voice and video recorder … etc.

Smartphones vary and differ among themselves in terms of features and capabilities as well as prices. The operating system is an important feature that must be focused on when making a new phone purchase this is for the fact that a system differs from another in terms of capabilities, ease of use and dealing with it.

2-3-1-1- Android:

The word "Android" means the robot (a person and a machine) or a robot that is in the form of a person. It is a Linux operating system for mobile phones, developed by Silicon Valley under the name Android Ink. In 2007 Google established the Open Mobile Alliance (OHA) that made the

Android operating system dedicated to providing services to a group Integrated software including basic operating system, middleware and mobile applications.

The basic kernel for the Android operating system is based on Linux, but it is designed to suit the direction of Google. Inside the Linux kernel there are players for display, camera, flash memory, keyboard, Wi-Fi, and sound.

The Linux kernel separates the parts of the phone and the applications loaded on it. It is also their responsibility to ensure that basic system services such as security, memory management, processor management, and networks work.

The Android system is free; as free applications outnumber paid ones. That is why it is widely used by universities and educational institutions that do not have professional programmers to build their own system. What's more, such systems are easy to use and update which makes it easy for professors, students and university administration.

2-3-1-2- IOS:

IOS system is an operating system, as it was initially known as (iPhone OSX), and this was the previous name of the system until the 7th June of the year (2010). This system appeared at the beginning of 2007 as an operating system manufactured by Apple for its iPhone. After that, it became the default system for the iPod touch in addition to the iPad tablet in another modified version of the interface measurements for the iPad. This system belongs to the family of Mac OS X since it has been sold from 2007 to 2010. There are approximately 400 million devices worldwide.

The system comes with several built-in applications, which are as follows: An Internet browser, mail, telephone in addition to music, pictures, weather, calendar, messages, camera, notes, reminders, videos, Apple maps, game center, and clock. There are also some applications such as phone, computer, compass, shares, checkbook, voice memo, contacts and corner News, App Store, and Settings. As for the iPod, all previous applications are installed on it except for the phone. This system occupies the first rank in applications and their number between mobile phone systems such as Android, BlackBerry and Windows Phone as it has more than 900 thousand apps and games. A dedicated device for iPad can download these applications through the App Store.

2-3-1-3- A comparison between iOS and Android:

- In the "Android" operating system, applications use the "Java" programming language that uses a learning process called "Garbage Collection". When the user of "Android" closes any application, the "Garbage Collection" process recycles the device's memory.
- The problem is that the process of "Garbage Collection" requires four to eight times the memory that is usually used to complete the tasks efficiently, and in the event that the required amount of memory is not available, this leads to a slow performance and spasm. "Android" phones come with a Great random access memory.
- On the other hand, and because the "IOS" system, which operates on "Apple" mobile devices, does not need a "garbage collection" process, 1 GB of RAM remains sufficient to provide the same

performance as Android phones with 2 or 3 GB of memory. The reason is due to the different nature of the IOS system that is used by iPhones. This system was developed by Apple, and the company wrote each code on its own specifically in order to for the applications to work in harmony with one another. Therefore, the system itself does not exploit a large part of the RAM and leaves more than enough space to run other applications in all comfort.

- Android phones are sourced from dozens of companies if not talking about hundreds with one system developed by one company, Google, which obliges every to develop and amend the system and add its own applications, resulting in a system that occupies a very large area in the RAM.

2-4- Best educational apps for smartphone users:

Free education sites via the Internet have made a great revolution in learning. Any internet user can easily learn what he wants at any time and from anywhere and in most times for free and without any cost. Because mobile phones are always with the users, they can benefit from many educational applications available for free, whether for Android phones or iPhones.

The most important applications that helps support university professors and students to make the teaching process easier and help them in teaching students are as the following:

2-4-1: Edx

One of the best educational electronic platforms in the world, where hundreds of free courses are offered in various branches, such as medicine, engineering, science, mathematics, history, education and teaching, arts, design, programming, and many other branches. All this is from the best universities and international institutes such as Harvard University, MIT, Berkeley University, Massachusetts Institute, or from the Microsoft Corporation and Linux. And you can join hundreds of free courses through the educational platform applications on your smartphone.

2-4-2- TED

You can learn something new every day by following the conversations of the world's best influential personalities, tech geniuses, the most luxurious medicine, and hard-liners in the defense of science and education. With this app, you can see the latest science in engineering, science, medicine, and technology, by watching over 1700 conversations available on the TED educational app, as well as dozens of conversations and videos added daily. Just download the right application for your smartphone, and enjoy what you have.

2-4-3- Udacity:

“Udacity” is designed to suit the requirements of students in the different stages. If you are a high school student seeking to prepare yourself before entering the university, or a university student seeking to expand his scientific knowledge, or even a professional who wants to see everything new and develop his talent, you will find what you are looking for in your field of work and study in lessons provided by Udacity.

The great thing about it is that these lessons or educational programs are not restricted to a specific time. They are always available on the site and new ones are added to them every period, and each study program is divided into lessons. Moreover, each lesson is divided into short videos - a minute or two - and punctuated by small tests to practice what you have learned. You can stop at any lesson and return after a long or short period of time to complete what you started from the same point. You can definitely return to the starting point when you want to do so to re-explain a part unless you understand it well. It is more like your practice of an electronic game that consists of multiple stages that you pass. It also provides a completion certificate when you have completed the studies for each course. You can participate in more than one course on Udacity.

2-4-4- Notability:

Notability is one of the simplest and coolest applications for smartphones to take notes. Not only this, the application is used to write ideas and organize your tasks with ease, as well as creating checklists and importing PDF files from email or Dropbox. Teachers and students can record lectures and lessons at school or universities in a simple way.

2-4-5- Google Classroom:

Google has released a new service called Google Classroom. This is a free educational tool for the use of the service, and that will help teachers and professors reduce the amount of paperwork stacked on their desks. It is a service from Google that aims to help teachers and students communicate better through a set of available tools that are constantly updated.

Perhaps one of the most important decisive issues which has a positive impact on the quality of the semester is the teacher-student communication inside and outside the classroom. With the beginning of a new semester, the teacher needs to determine with the students a study program with some details. This matter might somewhat be difficult especially if the semester is full. This in its turn could impair communication, and might generate difficulties for the teacher in the sense that each time the teacher needs to specify for the students some of the duties. At other times, the teacher could ask the students to print files related for the lesson. All of this is a tiring process and takes too much time.

Here comes the need to think about using digital technology and services in order to make these details more practical as it saves time and effort. This is what Google Classroom service provides.

With respect to the scheduling process of server, we utilize a “Greedy Algorithm” based scheduling approach. The procedure of the scheduling algorithm is illustrated in Fig. 1. More specifically, the main scheduling procedure is composed of four steps:

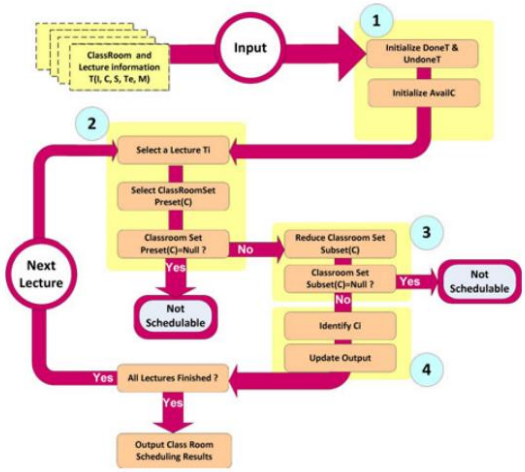

Fig (1) algorithm of Google classroom which depends on four stages. [Chao Wang,2017]

2-5-4-1- Advantages of using Classroom.

2-5-4-1-1-Duties

Google Classroom allows students to assign assignments, do homework and send it to the teacher electronically with the possibility of direct correction. The service also allows students to collaborate with the teacher to do homework or collaborate with other students. All of this is easily done on Google Drive for students and teachers. For the convenience of students, the service enables the teacher to send an answer form as an example to all students at one time.

2-5-4-1-2-Grades

The service contains different ways to monitor grades for students in a purely electronic way. Teachers have the feature of uploading students' grade files on the service, while students can view their grades directly. The teacher can also send student grades to each student separately, and students can comment and communicate with the teacher about any problem in the grades. More importantly, the teacher can adjust the grades at any time afterwards.

2-5-4-1-3-Communication

The teacher can place an announcement for students on the platform about anything he/she wants. Students in their turn can comment on the announcement and ask the teacher. The teacher can easily attach any file (video, text, audio) and others with the announcement. One of the greatest advantages when it comes to facilitating the communication process is that the service is fully integrated with Gmail. So, students can communicate with each other quickly via mail, because the student list will automatically appear for students and the teacher in his mail when he wants to send a message.

2-5-4-1-4-Archive lessons

If the time of a specific subject or curriculum ends at the end of the year or semester, the teacher can complete this subject with all files, comments and grades, so that this material stops appearing on the main page of the main learning board and appears only in the archiving section. The wonderful thing is that students and teachers can access it at any time they want.

2-5-4-1-5-Mobile learning

The service is distinguished by having an application on smartphones, which gives greater and quicker access to students and teachers. Among the most important features of the application is the possibility of direct communication with the teacher or students, as well as the ability to take pictures and attach them to the homework section, as well as sharing and uploading any files. It is worth noting that the application supports browsing in the absence of the Internet.

2-5-4-1-6-saving time

In order for the student to reach the required subject or chapter in the service, the teacher can create a new chapter in a few seconds. The system then generates a small code consisting of letters and numbers, to publish it to the students to use so that they could join the class by entering this code in a special parameter on the home page. The service also provides time for teachers to publish publications or scientific materials so that the teacher can post/publish files and announcements in a number of classes with one click without the need of posting in each chapter separately.

2-5-4-1-7-Academic Calendar

The platform provides the study calendar service which allows students and teachers to know the dates of assignments, exams, lessons and other important details. What's more, the dates are directly related to your email and the calendar is available in your mobile phone.

2.6. Covid-19 Viruses and Google Classroom

"Google Classroom" became popular in March (2020) - during the time of the Covid-19 epidemic. "Google Classroom" is a service that provides online learning tools and application via the web., with schools and universities closed.

"Google Classroom" always has users, but before March, 2020, it has not been in the top 100 list before. According to App Annie, the app has now exceeded 50 million downloads and is among the top five in the United States. The app is also popular all over the world, with a huge rise in downloads in countries like Indonesia, Mexico, Canada, Finland, Italy, and Poland.

Still, students are not big fans of the service in the sense that school children bomb the app with one-star reviews hoping that it will be removed and that they will no longer have to attend classes remotely. Reviews of both iOS and Android versions of the app are said to have included "Let's enjoy the SK vacation" requests. Workplace cooperation applications are also increasing. For example, there is the app for the Microsoft Corp. team with 12 million new users per week along with 7,000 new

customers. There is also the Slack Inc. Competition which is increasing levels of demand. Online communication tools now dominate app listings, with Zoom Video Communications Inc. leading Free app download charts. Other popular communication apps in the top 10 including WhatsApp in the sixth place, Hangouts Meet in the seventh, and Messenger Inc. in the eighth place, leaving Microsoft Team the ninth.

3.Conclusion

The distinguishing aspect of a well-designed e-learning environment is the ability to collect static data about students' engagement levels and learning outcomes in real time. The continuous use of data to fine-tune the content and approach reinforces the principle of returning the student to the process center. It enables the user to access his files and applications through the "Cloud", without the need for the application to be available on the device. This reduces the security risks and the required hardware resources. All what the user needs is a computer connected to the Internet, and to be connected to one of the sites that provides the software that he/she needs. It helps students and teachers to use applications without downloading them to their devices. Furthermore, it reduces costs by decreasing the number of devices for infrastructure, and provides the number of workers in the maintenance of hardware and software in the organization. It ensures that the service works permanently while saving a lot of time and money as the company is committed to providing the "Cloud" storage service to ensure that it works efficiently and continuously. Furthermore, the company fixes any sudden breakdowns as soon as possible. The current "Cloud" computing infrastructure includes the availability of data centers that are able to provide service to clients located worldwide. The learner, when using the "Cloud" systems and applications, feels his ownership of the education system, which pushes him towards continuous activity within the system in order to build his/her knowledge. The sharing process occurs either individually through the individual applications provided by the "Cloud" computing or collectively through the social applications provided by the clouds that allow learners to communicate and participate in sharing the learning contents.

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