Cloud Computing and its Impact on Online Education

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Abstract. The cloud computing system has a significant role in the distance education field, because it is an important tributary of virtual education, especially mobile and blended education. Perhaps, the only challenge that must be overawed is the comprehensive coverage of rapid access to the Internet. So, the student can benefit from the applications that we will call from now and onward cloud computing services. There is no need to establish evidence to emphasize the importance of employing technological innovations to develop educational practices for developing educational curricula in Iraqi universities, but it is vital to employ technological innovations in the educational process, and this must be related to overcoming the problems facing the educational process. Therefore, employment should not be for technological dazzling that often accompanies technological innovations, but employment must be a function of urgent needs or demands. In this study, the educational process concept, with its multiple cloud inputs and outputs, was discussed how the education crisis could be overcome in all its institutions by resorting to how to employ the electronic cloud in distance education. This study also examined all the specifications of that environment and the possibility of their application in colleges and educational institutions.

Keywords. Cloud, Distance education, Database.

1. Introduction

By developing modern technologies available through the web accelerating the flow of information through, companies or institutions, including educational institutions in open-technology countries, have moved to make their applications available via the Internet using this technology, which has benefited many large-scale beneficiaries, including universities. The main goal of establishing an educational site and center to serve the community of beneficiary students who are studying by meeting and satisfying their needs for the curriculum. The success and effectiveness of the educational website are mainly related to the quality of electronic cloud services because the services’ qualities have expanded to include electronic cloud services for all operations, activities, and facilities to provide all requirements for the students’ academic community. Its general goal is to deliver the courses and curricula, shorten the appropriate time and place, and lessen the effort and cost possible [1-5]. In the developing countries, including our communities, we find that they suffer from many problems in the computer systems in which they operate due to the presence of obstacles, including:
1- The inability to provide the appropriate infrastructure for the software and the necessary and continuous updates.
2- The limited computing resources in number, size, processor, speed, and storage media. It is eventually a resource, and every resource is characterized by scarcity.

It is imperative to use the resources available to us for optimal use to achieve the goals with high efficiency and lowest possible costs, for cloud computing is the technology of the era that depends on the transferring and processing of the storage space of the electronic computer, which is a server device that is accessed via the Internet. Information technology programs transform from products to electronic services, just because cloud computing provides a business model that provides unlimited computing resources such as software platform, data processing, and storage that are virtually unlimited to work by the business need anywhere and at any time the user requests. Therefore, providing a job opportunity would work in an open environment without technological problems with the possibility of easily acquiring equipment and devices and maintaining the management of technological resources [6-8]. The study dealt with the basic concepts of electronic cloud services, while it included the benefits of cloud computing for distance education and a blueprint for an educational system designed to create an educational website. The study also dealt with the results of a questionnaire and its interpretation and finally included conclusions and recommendations.

2. Study methodology

2.1. The problem of the study
The technical education sector suffers from a problem represented in “how to use hardware and computer programs and make all the technological resources available to our university students using the optimal use of the Internet via the electronic cloud.”

2.2. Objectives of the study
The researcher viewed a subject that may be considered a new topic in the education sector, which is distance education because many countries, including Western, Southeast Asia, North America, Europe, and Africa, have followed this path.
Cloud computing aims to:

1. Transferring the processing and storage space of the computer. Therefore, the informational, technological programs are transformed from products to services.
2. Providing a business model that runs unlimited computing resources with open space and time.
3. Providing educational services to the beneficiary students and graduates with higher degrees to benefit in terms of development or study in the e-learning (distance) field, just like the case in the world’s countries.

2.3. The importance of the study
The research is significantly vital on the theoretical side because it could provide a study for the educational library that researchers have not previously and practically dealt with. Secondly, this research deals with providing all service capabilities for using electronic devices and equipment that are not available to the beneficiary students and professors through the use of the electronic cloud. In turn, it contributes to enriching the educational process and benefiting from Internet services as follows:

1. Cloud computing has large storage areas.
2. The ability to maintain the security and confidentiality of students’ data.
3. It also provides comprehensive coverage for fast internet access.
4. The need to convince officials and decision-makers of the feasibility of moving to cloud computing.
2.4. The hypothetical design of the study

Cloud Computing

| Physical devices | Operating systems and computing applications | Cloud database activities and services |
|------------------|---------------------------------------------|--------------------------------------|

Distance education and human racial

| Applied Professor | The beneficiary student |
|-------------------|-------------------------|

2.5. The study hypotheses

Hypotheses are assumptions that require verification of their validity and are formulated depending on the hypothetical study model. Therefore, some primary and sub-hypotheses have been clarified according to the following:

2.5.1. The first primary hypothesis. There is a significant correlation between cloud computing and distance education in the field of study, from which the following sub-hypotheses can be branched out:

1. There is a significant link between cloud physical devices and distance education.
2. There is a significant correlation between operating systems, cloud applications, and distance education.
3. There is a significant connection between the cloud database activities and services and distance education systems.

2.5.2. The second primary hypothesis. There is a significant effect of cloud calculating on distance education in the field of study. The following sub hypotheses are divided into:

1. There is a significant effect of cloud calculating on the beneficiary student.
2. The existence of a significant effect of cloud computing on the applied professor.

The limits of the study, the fundamental limits of the study are cantered as follows:

A- Knowledge limits, the study covered both cloud computing and e-learning.
B- Spatial limits, the study was completed in the formations of the Northern Technical University.
C- Temporal limits, the study was conducted during the period 1/8/2020.
D- Human limits; in this study, a survey was adopted based on the students and the teaching professor’s opinions about the Iraqi universities’ formations as human borders for the current study.

3. Sample of the study

The research sample was chosen for testing the variables and the hypothetical model in line with the sound scientific foundations of the field of study to achieve the study’s objectives and directions. Therefore, colleges and educational institutes in Iraqi universities were chosen where the samples researched were three universities, and the questionnaire form was distributed by fifteen for each university. The sample was forty-five, ranging between questioned students and professors, where all distributed questionnaires were recovered 100%.

3.1. Methods of data collection

Methods of collecting primary and secondary data were adopted to complete the study, both theoretical and practical. The secondary data were extracted from the sources related to the study
variables to establish the theoretical frameworks, while the field side was centered on the primary data collected through the questionnaire form. It represented the components of cloud computing from physical devices and systems operating activities and services. As for the remote education variables, they were represented by the student and teaching dimensions.

3.2. Justifications for conducting the study
The study was applied to three Iraqi universities as a curriculum for the following reasons:
1- The scarcity of application of these two variables in previously educational institutions in the field of cloud computing and distance education.
2- Iraqi universities have human resources capable of achieving the field of application in the current study.
3- Paying attention to the need to invest human resources as resources that can achieve an addition in the cloud computing space in distance education.
4- Laying the fundamental pillars for future studies as a necessity through distance education.

4. The theoretical side

4.1. The concept of the electronic cloud
The electronic cloud is defined as a model that provides easy access to a communal set of devices such as networks, servers, storage, applications, and services through the Internet that can be prepared to work quickly and with little effort. It was also known as this technology that relies on transferring files and electronic resources within an imaginary space with the ability to provide additional storage space for the computers within the Internet and transfer it to the so-called electronic cloud, which is a server device accessed via the Internet. Thus, this technology contributes to keeping maintenance problems away from the companies using it and developing information technology programs. Therefore, the efforts of the beneficiaries are focused on using these services only [9-11]. The procedural definition of the electronic cloud is an electronic cloud in which the data is stored in the form of electrical impulses and accessed via the Internet through a computer or any device that can connect to the Internet.

4.2. Cloud computing concept
Cloud computing refers to the computer resources and systems available on-demand via the Internet that can provide several integrated computing services without being restricted to local resources to facilitate the user. These resources include data storage space, backup and self-synchronization, programmatic processing capabilities, task scheduling, mail payment, and remote printing. When connected to the network, the user can control these resources through a simple programming interface that simplifies and ignores the details and internal processes [12-14]. It is a technology that relies on transferring the computer’s computing and storage space to the so-called cloud, a server device accessible via the Internet. Therefore, it transforms information technology programs from products to services. The cloud computing structure depends on progressive data centers that deliver big storing spaces for customers [15, 16].

4.3. The concept of distance education
Distance education is a new trend in education that has benefited from developing information technology and tries to make the best use of new technologies for different geographical locations. That is why cloud computing is an attractive environment for students, teachers, and researchers. Having a new technology, it can provide universities, research centers an electronic educational environment with enormous potential and reasonable prices [17-20]. Students can use educational services outside the campus through their mobile devices from anywhere. Faculty members can easily access their study materials from their rooms and classrooms. Additionally, researchers can also find their scientific materials and research models’ needs and share their work in the cloud easily and quickly.
4.4. The concept of the educational process
The concept of the educational process was defined as the provision of education service to a large number of beneficiary students, who are divided into multiple groups, through a group of expert specialists and professors, using different means and tools, all of them in their nature and components, and this is divided into different nature and components. At some point, it is determined and scheduled in advance [9]. If we look at the education process through the system input, we find that the education process inputs include many resources that can be summarized in the outline shown in Figure (1).

5. Benefits of cloud computing for distance education

5.1. Encouraging cooperation and communication
Cloud computing’s ability to create a spirit of cooperation between learners, teachers, and others in academia. Because the files are easy to access, diverse users can make adjustments to any manuscript, such as managing plans or study projects. It will be straightforward for the teacher to propose amendments to an essay or assignment submitted by the student. All needed to do is access the student file in the cloud, save his notes, and notify the student by the system. No more paper material, no multiple email correspondence, everything is integrated into one system for easy access [21-23].

5.2. Material cost
The electronic cloud provides many necessary common resources and services, enabling professors and students to reduce spending on study materials and methodology. The lecturer can download lectures to the electronic cloud. Therefore, removing the need for books and paper lectures and reducing the costs of printing and reproduction. The entire student’s need is a computer that enables him to access various study materials on the cloud via the Internet. The scientific departments can also reduce capital expenditures and reduce current operating expenses through cloud computing and benefit from the expertise of specialized employees without the need to resort to searching for employees, employing, hiring, training them, and paying their salaries.

5.3. Record keeping
Cloud computing enables teachers and students to examine the cloud records when any disagreement or problem occurs, as it is possible to simply check the entry records, look at the files uploaded, and verify whether the coursework was submitted late.
5.4. Amenities
Cloud computing offers to university teachers and students alike with more convenient and efficient education knowledge. The cloud keeps all data in one place, from class attendance records to homework, curriculum browsing, and more. Everyone can access the system and access to different curricular materials, and this process is of more significant benefit to students who study via the Internet and need the flexibility to succeed in completing their educational program. Perhaps, in the future, cloud computing will have a significant impact on the educational environment since it can provide the learner’s infrastructure and resources to carry out any number of tasks on the cloud while reducing the cost and also provide them with easy access to the massive amount of information that is available on the Internet, as shown in Figure (2).

Figure 2. Explains cloud computing and its connection to the Internet.

5.5. Ease of implementation
An educational institution can adapt and publish without purchasing hardware and programs, software authorizations installation, activity, maintain services, and cloud computing apps.

5.6. Capability
The institutions that use cloud computing do not need to add hardware and software with higher standards and competencies when growing teachers’ numbers. They are not obliged to buy a new expander to purchase more computers, storage systems, switches, and routers. Cloud computing service guarantees speed in joining and dealing with modern technologies on the Internet.

5.7. Reaching the maximum capacity of information technology
Cloud computing can allow teachers to reach the highest efficiency of software that may attract students to follow their daily lessons, especially for small educational institutions,

5.8. Teacher redeployment
By dropping or removing updates required by fixed servers and other computing problems that reduce costs, time, money, or developing applications, IT departments can focus on higher-value tasks and focus on core competencies.

5.9. Measurability
It means that using cloud computing resources and properties can be measured. This must be completed for each student and applied daily, weekly, monthly, and annually [24].

Second: What are the uses of cloud computing, and what its applications which are used in distance education:

1- Software as service applications: Here, the teacher does not need to buy equipment or software, download, update, or delete because what is required is only to subscribe to the service and enter it via the Internet via an Internet browser.
2- Platform as a service: It is a set of software and product development tools hosted on the “platform as a service” infrastructure.

3- Infrastructure as a service: It is an extension of the computational environment where the teacher can control more infrastructure parts. By serving the infrastructure, students have access to the virtual server in the Data Funding Service Centre. The teacher can deploy and run the software, including operating systems and distributed applications [25].

6. Types of cloud computing
Private cloud represents private networks for using a specific party, providing complete data monitoring, and ensuring security and data quality. It may be run by a third party and accessed at work or home far from the workplace.

- Shared community cloud: The community cloud infrastructure is shared by many organizations that usually have similar necessities and interests and the same field of work, and access to the cloud can take place from the workplace that shares this service.

- Public cloud: It is available to the general students and is built on a commercial basis and is usually owned by companies selling cloud services. This allows the teacher to develop and work on specific software or exploit a specific resource from service in the cloud with minimal material resources than the large expenses usually associated with owning those services.

Hybrid cloud: The cloud infrastructure has a composite of two or more clouds, whether private or public, linked to unified standards or unique technology that enables them to allow data and applications to be transferred from one cloud to another [5].

7. Description of the proposed system
In this research, a software platform called cloud computing services was designed, and the infrastructure needed to run cloud computing applications was designed, a model for application programs for the Internet, software download services, and an electronic library. Teachers were given specific powers to access the platform’s computing services and recover students’ passwords by email. For each student, to maintain complete confidentiality in cloud computing, the proposed system contains a set of inputs, namely:

1) The software platform service screen and the main program interface.
2) Software download service screen.
3) Storage service screen.
4) The electronic library screens.
5) Cloud manager screen.
6) Password recovery screen.
7) Contact us screen.

The following must also be taken into account in the entries:

1- Accuracy and accuracy of the outputs.
2- That the inputs are sufficient to give the required output.
3- Taking into account the coordination of the backgrounds and aesthetics in the platform screens.
4- Using drop-down lists in programming to reduce the input process.

System schematic: It is a chart that shows or describes the activities carried out by the system, and it is a form that starts with a symbol password that represents the beginning state and ends with a symbol that represents the end state. Some, using arrows, illustrate the transition from one activity to another. This chart also shows comparisons of the activity that accepts two cases in a specific form as in chart (1) [7].

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The sequence of objects and the front end have a role in the procedural operations, which clarify the messages exchanged and the required effects between the objects in the operation process of the system, as shown in Figure (3) and Figure (4).

Figure 3. The flow comparisons of an activity that accepts two states in a given form.

Figure 4. Explains the exchange of messages and the required effects between the objects in the process of operating the system.

8. Presentation and interpretation of the questionnaire results
First: Presenting the results of the questionnaire, explaining the strengths and weaknesses in each educational field. This paragraph includes a description of the main study variables and their diagnosis because cloud computing is adopted as an independent variable, and e-learning is an accredited axis at the Northern Technical University, and for this purpose, appropriate statistical analyses have been used. After the researcher found the average of the weighted mean and the percentage weights of the paragraphs within each axis and each separately, to show the strength and weakness side of each dimension, the results are as follows:
Describe and diagnose the research variables of the cloud computing axis variables, table (1): The arithmetic means and standard deviations of the research sample responses for the cloud’s physical dimension, Tables 2 to 4.

The study hypothesis test: The first primary hypothesis test states that there is a significant correlation between cloud computing and distance education:

H0: There is no significant correlation between cloud computing and distance education.

H1: There is a significant correlation between cloud computing and distance education. The following sub-hypotheses stem from it

1- There is a significant correlation between cloud physical devices and distance education.
2- There is a significant correlation between the operating system, cloud applications, and distance education.
3- There is a significant correlation between cloud database activities and services and distance education.

Table 1. The arithmetic means and standard deviations of the research sample responses for the physical dimension of the cloud.

| Paragraphs                                                                 | Arithmetic mean | Standard deviation | Percentile weight |
|---------------------------------------------------------------------------|-----------------|--------------------|-------------------|
| 1- Simple device features in cloud computing and accessibility for any device that supports distance education. | 3.8444          | 0.90342            | 76.888            |
| 2- Sharing information sources through a central database that provides great flexibility in terms of time and space in dealing with distance education. | 3.7556          | 0.93312            | 75.112            |
| 3- The cloud computing reduces some of the burdens of maintaining and developing the devices that support storing lectures and creating a session that includes all the facilities available for reading the lecture by the student. | 4.0667          | 0.75076            | 81.334            |
| 4- Achieve faster processing of lectures by the presence of the electronic cloud. | 3.7778          | 1.18492            | 75.556            |
| 5- High control over storage flexibility for databases. | 3.6222          | 0.96032            | 72.444            |
| 6- Low costs of devices used in education and the ability to distribute tasks to devices not available to the professor. | 3.8222          | 0.80591            | 76.444            |
| Cloud physical devices. | 3.8148          | 0.59905            | 76.296            |

Table 2. The arithmetic means and standard deviations of the operating system and cloud applications dimension.

| Paragraphs                                                                 | Arithmetic mean | Standard deviation | Percentile weight |
|---------------------------------------------------------------------------|-----------------|--------------------|-------------------|
| 1- Allow operating systems and cloud applications to deal with traditional operating systems in computers and mobile devices. | 3.4667          | 0.89443            | 69.334            |
| 2- High flexibility in dealing with Internet browsers. | 3.6667          | 0.87905            | 73.334            |
| 3- Cloud computing reduces some of the burdens and problems of maintaining and developing software applications and operating systems that support distance education databases. | 3.2667          | 0.86340            | 65.334            |
| 4- The possibility of benefiting from the software expertise of the cloud service provider. | 3.4             | 0.88933            | 68                |
| Operating system and cloud applications. | 3.45            | 0.61607            | 69                |
Table 3. The arithmetic means and standard deviations of the activities and services of the cloud database.

| Paragraphs | Arithmetic mean | Standard deviation | Percentile weight |
|------------|-----------------|--------------------|-------------------|
| 1- The possibility of an update on the lectures from deletion, modification, and addition | 3.9 | 0.96766 | 78 |
| 2- Realization of the synchronization feature so that students can view the lecture simultaneously | 3.4889 | 1.16037 | 69.778 |
| 3- Allows joint work between groups of students and the possibility of deletion and modification of the lecture | 3.5778 | 0.98832 | 71.556 |
| 4- Work guarantee around the clock | 3.3778 | 0.98371 | 67.556 |
| 5- Enhance flexibility by holding new sessions so that the professor can make the necessary arrangements for presenting the lecture within hours | 3.8000 | 0.99087 | 76 |
| 6- The ability to update lectures from deletion, modification, and addition | 3.7778 | 0.79455 | 75.556 |
| Cloud database activities and services | 3.6513 | 0.71358 | 72.74 |

Table 4. Shows the order of dimensions of cloud computing.

| Dimensions | Arithmetic mean | Standard deviation | Percentile weight | Arrangement of dimensions |
|------------|-----------------|--------------------|-------------------|---------------------------|
| Cloud physical devices | 3.8148 | 0.59905 | 76.296 | First |
| Operating system and cloud applications | 3.4500 | 0.61607 | 69 | Second |
| Cloud database activities and services | 3.6513 | 0.71358 | 72.74 | Third |
| Cloud Computing | 3.6340 | 0.55742 | 72.68 | |

Description and diagnosis of the variables of the distance education axis, Table 5.

Table 5. The arithmetic means and standard deviations of the distance education axis.

| Paragraphs | Arithmetic mean | Standard deviation | Percentile weight |
|------------|-----------------|--------------------|-------------------|
| 1- It reduces the burden and technical problems, making it easier to control the presentation of the educational session smoothly | 3.5111 | 0.94441 | 70.222 |
| 2- Cloud computing supports cognitive awareness among students working on the Internet | 3.0889 | 1.22144 | 61.778 |
| 3- Cloud computing supports the regular teamwork of both the student and the professor | 3.5778 | 0.98832 | 71.556 |
| 4- Cloud computing allows the top management to see what the educational level has reached remotely | 3.3778 | 1.09314 | 67.556 |
| Distance Learning | 3.3889 | 0.71620 | 67.77 |

The study hypothesis test: The first primary hypothesis test states that there is a significant correlation between cloud computing and distance education, Table 6:

H0: There is no important relationship between cloud computing and distance education.
H1: There is an important association between cloud computing and distance education.

The following sub-hypotheses stem from it
1- There is an important correlation between cloud physical devices and distance education.
2- There is an important correlation between the operating system, cloud applications, and distance education.
3- There is a significant correlation between cloud database activities and services and distance education.
Table 6. Correlations representation.

| Distance education | Pearson Correlation | Sig.(2-tailed) | N   |
|--------------------|---------------------|----------------|-----|
| Cloud devices      | 0.539 **             | 0.000          | 177 |
| Operating system and cloud applications | 0.615 **           | 0.000          | 177 |
| Cloud database activities and services | 0.650 **            | 0.000          | 177 |
| Cloud Computing    | 0.766 **             | 0.000          | 177 |

**. Correlation is significant at the 0.01 level (2-tailed).

The second primary hypothesis test: It states that there is a significant impact of cloud computing on distance education, Tables 7 to 10:

H0: There is no major effect of cloud computing on distance education.
H1: There is an important effect of cloud computing on distance education.

The sub-hypotheses stem from it are:

1- There is a major impact on the physical devices of cloud computing on distance education.
2- There is a significant impact on the operating system and cloud computing applications on distance education.
3- There is a significant impact of cloud computing activities and database services on distance education.

Table 7. Represents a schedule for analysis of variance.

| Model   | Sum of Squares | Df  | Mean Square | F      | Sig. | R² |
|---------|----------------|-----|-------------|--------|------|----|
| 1       | Regression     | 32.276 | 1  | 1 | 32.276 | 248.473 | 0.000a | 0.587 |
|         | Residual       | 22.732 | 175 | 0.130 |        |        |     |
| Total   | 55.009         | 176 |              |        |      |     |

a. Predictors: (Constant), X
b. Dependent Variable: Y

Table 8. The impact of cloud computing on distance education.

| Model   | Unstandardized Coefficients | Standardized Coefficients | T   | Sig. |
|---------|-----------------------------|---------------------------|-----|------|
|         | B                           | Std. Error                | Beta|      |
| 1       | (Constant)                  | 0.348                     | 0.212 | --- | 1.644 | 0.102 |
| X       | 1.074                       | 0.068                     | 0.766 | 15.763 | 0.000 |

a. Dependent Variable: Y

Table 9. The impact of cloud computing dimensions on distance education.

| In dependent variable | Distance education |
|-----------------------|--------------------|
|                       | F | R² | B | Impact indication |
| Cloud physical devices | 71.644 | 0.29 | 0.451 | moral |
| Operating system and cloud applications | 106.273 | 0.378 | 0.553 | moral |
| Cloud database activities and services | 128.286 | 0.423 | 0.552 | moral |

Table 10. Represents the order of priority for the effect of the explanatory sub-variables on the adopted variable

| No. | Explanatory sub-variables | The effects | Impact significant | order |
|-----|---------------------------|-------------|--------------------|-------|
| 1   | Cloud physical devices    | %45.1       | Moral              | Third |
| 2   | Operating system and cloud applications | %55.3 | Moral | First |
| 3   | Cloud database activities and services | %55.2 | Moral | second |
9. Conclusions

First: the axis of cloud computing

1- After showing physical cloud devices, it was indicated that the obtained arithmetic mean is 3.8148, and the standard deviation is 0.59905, and the percentage weight is 76.296, which is greater than 60%, indicating that there is a strong indication of this dimension. This dimension received the first order, as shown in Table (4). The third paragraph of this dimension also obtained the highest percentage weight with an arithmetic mean of 4.0667 and a standard deviation of 0.75, as shown in Table (1).

2- After the cloud database activities and services, it was obtained an arithmetic mean of 3.6513 and a standard deviation of 0.71358, and its percentage weight was 72.74, which is greater than 60%, which indicates that there is a strong indicator for this dimension. This dimension has been ranked second, as shown in Table (4). The first paragraph of this dimension also obtained the highest percentage weight, with an arithmetic mean of 3.9 and a standard deviation of 0.96766, as shown in Table (3).

3- The operating system and cloud application dimension obtained an arithmetic mean of 3.4500 and a standard deviation of 0.61607, and the percentage weight was 69, which is greater than 60%, which indicates that there is a strong indication of this dimension. It obtained the third rank, as shown in Table (4). The second paragraph also obtained the highest percentage weight for this dimension with an arithmetic mean of 3.6667 and a standard deviation of 0.87905, as shown in Table (2).

Second: Distance education axis.

It was obtained an arithmetic mean of 3.3889 and a standard deviation of 0.71620, and its percentage weight was 67.77, which is greater than 60%, and this is a strong indication of this axis. The third paragraph of this axis had the highest percentage weight, with a mean of 3.5778 and a standard deviation of 0.98832, as shown in Table (5).

Third: The first primary hypothesis was accepted, which states a significant correlation between computational computing and electronic education. It rejected the null hypothesis since the Pearson correlation coefficient’s value was significant and equal to 0.766 because of the significant value of sig. It is equal to (0.000), and it is less than 0.01 and with 99% confidence, as shown in Table (6). As for the sub-hypotheses, the following inference is explained:

1- A significant correlation between cloud physical devices and e-learning, where the correlation value was equal to 0.539 because the sig is the significant value. It is equal to (0.000), which is less than 0.01 and with a confidence of 99%.

2- A significant correlation between the operating system, cloud applications, and e-learning, where the correlation value was equal to 0.615 because of the significant value of sig. It is equal to (0.000), which is less than 0.01 and with a confidence of 99%.

3- A significant correlation relationship between the activities and services of cloud data and e-learning, where the value of the correlation was equal to 0.650 because of the significant value of the sig. It is equal to (0.000), which is less than 0.01 and with a confidence of 99%.

Fourth: Accepting the second central hypothesis, stating a significant effect of cloud computing on e-learning and rejecting the null hypothesis. The F test results indicate the presence of an effect of cloud computing on e-learning, where the calculated F value reached 248.473 at a significant level of 0.05, and the value of P was 248.473. The value is equal to (0.000), which is less than 0.05. It indicates the existence of an impact of cloud computing on e-learning, as shown in Table (7).
Fifth: The value of R2 equals 0.587, which means that the computing cloud has explained 58.1% of the changes that occur to e-learning, as shown in Table (7).

Sixth: The effect value of (B) is equal to 1.074, which means that increasing the cloud computing variable and one of the standard deviations will lead to an increase in electronic learning by 1.074% of the standard deviation unit, as shown in Table (8).

Seventh: The impact of the dimensions of cloud computing on e-learning is:
1- Table (9) indicates that the value of R2 is equal to (0.29) and this means that the physical cloud devices have explained (29%) of the changes that occur to e-learning, and the value of B = 0.451 means that the variables of physical devices increase cloud, one unit of standard deviations will lead to an increase in electronic learning by 45.1% of a standard deviation unit.
2- Table No. (9) indicates that the value of R2 is equal to (0.378), which means that the operating system and cloud applications have explained (37.8%) of the changes that occur to e-learning, and the value of B = 0.553 means that the increase in system variables operating and cloud applications, one standard deviation unit will lead to an increase in electronic learning by 55.3% of a standard deviation unit.
3- Table (9) indicates that the value of R2 is equal to 0.423; this means that the activities and services of cloud databases have explained 42.3% of the changes that occur in marketing performance, and the value of B = 0.552 cloud database activities and services. Each unit of standard deviations will increase electronic learning by 55.2% of a standard deviation unit.

Eighth: The priority of the effect of the sub-variables of the independent variable on the dependent variable was arranged as follows:
A. The cloud operating system and cloud applications, their impact was 55.3%, which is the first.
B. Cloud database activities and services, the effect was 55.2%, which is the second.
C. Cloud physical devices; their impact was 45.1%, which is the third.

Ninth: The process of managing and controlling the site is carried out by an authorized person skilled in information technology and ways to benefit from the contents of the electronic cloud.

Tenth: Experts and workers in the technical field in higher education institutions have agreed that there is no transmission effectiveness unless there is a high speed in transferring data via the Internet.

10. Recommendations
1- The researcher considers providing physical cloud devices because it reduces some of the burdens of maintenance, a development that supports storing lectures and setting up sessions that include all the facilities available for reading the lecture by the student.
2- The researcher emphasizes the introduction and activation of the cloud computing database system, allowing joint work between groups of students and the possibility of deletion and modification.
3- The researcher believes that activating the cloud operating system and cloud applications leads to high flexibility in dealing with Internet browsers without problems.
4- The researcher confirms that cloud computing supports the organized teamwork of both the student and the professor in e-learning.
5- The researcher considers increasing the variables of cloud computing because an increase of one unit leads to an increase in the percentage of e-learning through the effect of cloud computing dimensions.

6- The researcher affirms the necessity of implementing a free software platform for cloud computing services to be used for its applications in education.

7- The researcher believes that the site should be developed according to the needs that may appear in the future.

8- The researcher considers the necessity of studying the necessary infrastructure for cloud computing applications and the possibility of integrating it with e-learning to serve the technical education process.

9- The researcher sees the possibility of implementing a model for application programs on the Internet that support cloud computing services.
   a. The researcher sees the possibility of giving a specific storage space to each student and modifying it in the event of increased use.
   b. The researcher stresses the need to provide a competent person authorized to examine and audit the site, the storage process, and the process of entering the educational site with the presence of a password to maintain the confidentiality of information, download lectures, and receive answers to questions of student’s users.

10- Providing all the requirements needed by the educational process through its connection to the Internet.

11- The use of cloud computing reduces the suffering of higher education institutions, represented by the lack of clear digital development plans.

12- Reducing the rate of emergence of a malfunctioning system resulting from not bearing the pressure resulting from the increasing demand for infrastructure capabilities.

13- The increase in the desire of experts and workers in the technical field in higher education institutions to switch to virtual cloud services has increased by half to enhance the presence on the Internet and increase confidence in the system.

14- The establishment of a special building for information systems requires huge sums and may be an obstacle to the development of digital education, as it helps with thermal emission and energy consumption.

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