Study the Effect of Using Google Classroom on the Academic Performance Under the Covid19 Pandemic Using Data Mining Technique

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Abstract—In light of the pandemic that has swept the world, the use of e-learning in educational institutions has become an urgent necessity for continued knowledge communication with students. Educational institutions can benefit from the free tools that Google provide and from these applications, Google classroom which is characterized by ease of use, but the efficiency of using Google classroom is affected by several variables not studied in previous studies Clearly, this study aimed to identify the use of Google classroom as a system for managing e-learning and the factors affecting the performance of students and lecturer. The data of this study were collected from 219 members of the faculty and students at the College of Administration and Economics at the University of Baghdad in Iraq and have reached Google classroom offers all the technologies wanted by students and lecturer but there is a positive correlation between lack of knowledge of technical matters and decrease in the use of Google classroom and online education and vice versa.

Keywords—e-learning, learning management system, Google classroom, academic performance, Covid19 pandemic, data mining, deep learning

1. Introduction

Today the whole world is facing the spread of the Coruna virus, which first appeared in December 2019 in the city of Johan, central China, and then the infection began to spread from one country to another, until the disease spread in most countries of the world, which made the World Health Organization considered it and classify it as a global epidemic and pandemic. In addition, what was followed by the declaration of the state of emergency in most of the countries of the world, in an attempt to limit the spread of the virus, and the resulting result to disrupt businesses, companies and institutions, including educational institutions such as schools and universities, where study was disrupted in most countries of the world. Therefore, companies and institutions that provide educational and educational services have raced to develop their capabilities for educators to benefit from their electronic programs and applications in support of

education in emergency situations. For example, Google has made some of its applications available free of charge to teachers, lecturers, students, and educators. This pandemic and the resultant closure of educational institutions put education at a real risk, shifting attention and focusing attention towards e-learning, in an attempt by educational states and institutions to maintain and protect education as a societal, humanitarian and necessary priority [1, 2]. The use of electronic education requires a strong physical and human structure, and an educational system that supports this is confirmed, and this is confirmed by many studies. The requirements for the use and success of electronic education are summarized in providing a solid infrastructure, trained human resources and cadres, and ready to use this type of education, upon looking and examining the Iraqi educational system, we find that we need these factors in order to make e-learning successful [3, 4]. It has become necessary for each and every institution to develop and enhance tools and strategies they have to stay at the same pace with the ongoing development, by reframing the strategies they use, their methods, and teaching methods you follow, and the most notable impact of this development [5, 6].

2. E-learning

The University seeks to stay in touch with science and scientific developments in e-learning styles that are very popular these days, why not of great benefits including assistance in raising the scientific level of achievement of the student [7, 8]. Educational institutions should conduct an electronic application for E-learning Management in their institutions; the application shall make communication between teachers and students easier, act as a support and complement to traditional teaching, and provide timely exercises to students in order to become an integrated system responsible for managing the education process via the Internet. The mentioned application was called Learning Management System because it involves courses and tasks for enrollment, registration and administration, student learning follow-up, and test management. Companies and companies are required to produce a learning management system, LMS one of these applications (Moodle) and (blackboard) application, (LMS), and recent applications include Google Classroom G.C [9-11] It is based on the expansion of educational resources, in addition to assisting university faculty members by allowing them to apply scientific expertise more, saving time and effort, in addition to providing opportunities to train for continuous and updated familiarity of the up-to-date science. It also helps to raise the desired level of thinking among learners, as well as allowing student independence and autonomy [12, 13]. How to confront informal learning problems, social networking, evaluation, and a mobile-phone learning climate, as well as seeking for solutions, are some of the most critical challenges of e-learning in postgraduate education, and also looking for methods to manage them correctly. Utilize all of these benefits. Educational institutions must find the most suitable application to manage e-learning in their institutions and universities, and this study aims to define this problem: the establishment of a management system e-learning is effective and efficient in the educational process contributes to the achievement of the University's policy towards the

use of e-learning [14, 15]. The latest application that is currently being used in e-learning is (GC) because it is a free application that offers teacher with all the facilities that can help him to deliver appropriate material to learners in various methods and allows teachers, learners, management, and parents to communicate so that the teacher helps in achieving that assessment in various methods, it is also featured for its easy use, ability to join and link all other Google applications, and merge them to learning with ease [16]. It is possible to use e-learning on a variety of laptops and computers, mobile phones, and smart devices, and it does not necessitate the use of a technical or specialist to use it, so the researchers in this study are going to attempt to verify the effectiveness of using this application in the educational level process, as well as its effectiveness in developing students' performance, by attempting to present the necessary software solutions. Researchers believe that higher education represented by universities seeks to overcome obstacles that face their students and try to diversify their teaching methods. They recognize that e-learning is an important means of overcoming these barriers, but these universities face a challenge in selecting the right e-learning management application. Researchers at the university discovered that they are always looking for the simplest, fastest, and least costly method to use for handling e-learning, computerizing the educational process, and taking advantage of all the benefits of learning.

3.   Learning management system

A learning management system is a software program that allows you to control educational content. Using the Internet or local networks, the educational process is tracked and recorded [17]. Define a learning management system on a larger scale and across organizations as an application program that is dependent on the presence of a server that offers and manages e-learning and all of its specifications over the Internet, allowing the instructional process to be managed at anytime, anywhere, and at any time.

A learning management system, according to researchers, is a software program that helps administrators and teachers monitor and regulate e-learning, as well as allowing learners to access scientific materials, communicate with peers, teachers, and officials, and access current information sources through the Internet. For the learner and others in charge of the educational process, at the right time and place. It is noteworthy that a good learning management system can join and link educational aims, lessons, and individual courses, integrate lessons with academic courses, And the possibility of dividing the course into multiple levels for students to use, because it is a comprehensive management system based on collecting the results of the educational process and student results, and providing students' progress according to the course level of the student [18]. It belongs to the American Association for Training and Development, among the characteristics of the learning management system is integration and the ability to link with other systems, especially with human resources systems and student information systems, as it must have the property of managing academic records, curricula, diplomas, budget, and schedules, in addition to having the advantage of being able to access to the content based on specific permissions, it allows users to easily develop and manage content, store content and link it to educational curricula as a third

party, with the ability to display the places of defects and gaps with the trainees, and it rises to support the evaluation process in various ways, and to build upon clear and approved standards, and allows you to communicate and work with Other systems and facilitate the evaluation process. Output data to link and process it with other systems, provide data for our safety and security, and guarantee the privacy of the parties to the education process [19, 20]. That is to say, a good learning management system should be decentralized, with self-service and self-directed services, and the ability to rapidly aggregate learning content; it should also enhance training platforms on a platform that can be developed across the Internet, and it should have capacity transfer, technical support, and growth. A learning management system has many benefits, which is one of its characteristics: Structure centralization: such that all related learning functions are centralized and handled in one framework, allowing learners, administrators, and teachers to control the educational process from one system. Since it has high protection systems and can distribute authorization to users, the device easily has a high potential in terms of security and protection [17, 21]. The provision of registration service in the system, inserting people quickly and efficiently in different ways, showing materials, and assessing approved persons only during the allowed periods are all advantages of registration. It has a delivery function that allows the learner to deliver the tasks assigned to him to be analyzed according to an organized programmed methodology, and it can interact by allowing the learner to interact with the material, his peers in a class, or the learner himself. The assessment enables various ways of presenting the assessment, storing, saving, and reviewing data, as well as assisting in the linking of evaluation results to other matters, such as moving to higher courses or returning to previous cycles based on the evaluation outcome. The framework grants access by assisting educated teachers and administrators in following the educational process and sending a series of reports; reports must be sent to the parties involved in the educational process. The detail can be accessed at any time, and it has a large storage capacity for keeping records and storing data for the educational process, as well as the ability to modify and use it. It also facilitates reuse by allowing for the reuse of existing sources, content, and data, as well as the ability to re-create the educational session calendar at any time. It should provide enough anonymity for users to add and change interfaces and displays in the colors and styles that they want. The ability to communicate with other systems and applications that it can interact with is measured by the system's integration and usability. It allows users to share data with one another. Finally, it needs to has high administrative power. To put it differently, the system allows for administration. The technical system is both versatile and centralized, allowing it to easily handle and monitor all of the system's functions, rights, and features, such as time and location, and in a variety of languages.

4. Google classroom application

1995 is the year of Google's birth in the United States of America at Stanford University, and the idea started by doctoral students Larry Page and Sergey Brin to create a search engine that depends on links and evaluates pages according to their importance

and then displays them according to this importance, and they called it (Backrub) (Backrub). Then they replaced the name with Google View, In Google Phew, the basic idea behind the clap is to arrange the data and information, so that it is easy to access and interact with. Google Classroom is one of the free Google products, and the purpose of this application is to organize and manage the educational process, it provides the teacher with all the requirements that help him in presenting the curriculum to learners in an organized and useful way, and allows the teacher to communicate with learners quickly and in multiple ways. The ease of use, and the ability to link this application with other applications provided by Google, made this application widely used.

5.   Data mining

Data mining is the process of human search using computers for knowledge from the large amount of data currently available without any preconceived notions or assumptions about the essence or nature of this knowledge. Data mining can also be said as a method of analyzing a large amount of available data in order to find, discover or identify a logical relationship that summarizes the data in new, clear and useful ways for the data owner. The relationships and summary data obtained from data mining are called "models" [22]. Data mining always works on existing data and used for a purpose other than the purpose of data mining (for example, an air traffic database at an airport), and from this we can conclude the following that the process of data mining is not affected by the way the data is collected. This is one of the reasons why data mining differs from statistics. When analyzing big data, there are great challenges, including identifying the distinctive characteristics of the data, determining the acceptable and useful time period in the analysis process, and determining the importance of the discovered patterns, whether they are important to the data owner. When new data patterns are discovered, the goal is to generalize the results to the entire data (for example, to analyze customer data for a company in order to anticipate future customer wants). Data mining also aims to reduce or compress large amounts of data in a simple way that expresses the entire data without generalizing. Data mining is one of the new concepts in information engineering. It emerged as a result of the great development that took place in the use of the database in the second half of the nineties of the twentieth century, and its emergence coincided with the need for the so-called 'knowledge discovery'. The development of information technologies has provided wide possibilities for dealing with large amounts of data, and provided the necessary means for storing, modifying and extracting information from it at institutions that use informational means and their work relies heavily on information systems and data such as banks, insurance companies, and others.

The rapid growth of the needs of institutions and the increase in the sizes of modern data stores that are collected in long stages of time on the one hand, and the different nature of the data that can be stored on the other hand, made the traditional statistical methods insufficient to fulfill all the requirements of data analysis, which required the development of new methods that use technologies Artificial intelligence in analyzing that huge amount of data, and extracting what is important for useful knowledge [23].

These technologies and tools led to the emergence of the so-called knowledge discovery in databases (KDD) database, which was a separate branch of informatics in itself. Several conferences were held under his banner, the first of which was in 1991, and a special journal of this science was published in 1997 called Fayyad, and many researches were carried out in his field and other related fields, including database technologies, statistics and machine learning. It is difficult to give an accurate definition of the process of knowledge discovery from the human nervous system. The most common definition is: "a complex process aimed at identifying useful, understandable and new parts of the data." The terms "data mining" and "knowledge discovery" are often used synonymously. The term "data mining" is commonly used in industry. The term "knowledge discovery" is a common term in scientific research. On the basis of the scientific approach, the process of "data mining" is not one stage of "knowledge discovery". It consists of data analysis and detection algorithms that produce, in an acceptable time, special samples of data.

6. Data analysis

Two technique for data mining used:

- Deep learning technique
- Statistical technique

6.1. Deep learning

Most modern deep learning models are based on artificial neural networks. A deep neural network (DNN) is an artificial neural network (ANN) with multiple layers between the input and output layers [22] . DNN finds a way to properly mathematical manipulation to convert input to output, whether it is a linear relationship or a nonlinear relationship. The network travels through the layers to calculate the probability of each output. Artificial Neural Network is an information processing system, consisting of a large number of the processing elements are called neuron nodes, and the main feature of artificial neural networks is the simultaneous, parallel, and distributed processing.

In addition to the general correlations of the elements of treatment, adaptive generalization, self-regulation, and calculation speed, all of these make them very useful in classification matters. Deep learning was used to classify the performance of student and lectures to as well or bad Backward propagation learning method was used because of its high performance in classification. Perhaps this method or algorithm is the most popular method for teaching multi-layered neural networks, and it is one of the learning methods that depend on examples or patterns (supervised learning), where the network is defined by the input patterns as well as the required output patterns. The data (examples) that the neural network is trained on are represented as vectors, and the number of data in the vector depends on the type of problem to be solved and also the network architecture, and the data may be in the form of logical values (0, 1). There are other parameters of the network that must be set, such as: the learning rate, which is used to

increase the speed of learning the network, the number of times the network is trained on patterns or examples, and the percentage of accuracy that the network must achieve. The most difficult stage in training the network is finding the appropriate number of units in the hidden layer that gives the best results assuming that other network parameters are installed. This is done by experimenting and comparing the network accuracy. The study was conducted at the College of Administration and Economics at the University of Baghdad in Iraq, and included two groups of lecturers and their number was 92 and a group of graduate students and their number was 127. In this paper a Backward propagation network consist of one input layer, one output layers and two hidden layers was designed to predicts the academic performance the input layers had 44 node the entries consist of the age variable, the gender variable, and the certificate variable, in addition to the 41 questions included in the questionnaire the output layer had one node It represents the performance of the teacher or the student, is it good or bad when using Google Classroom and e-learning. As for the data, it was coded to fit the input of the neural networks, where age, certificate, gender, and answers to the questions in the questionnaire were divided into categories. Deep learning techniques were used to predict the performance of students and teachers in e-learning with the use of Google Classroom under the pandemic. For the purpose of applying data mining techniques, the data was divided into two parts: the training section and the testing section, and neural networks were used to predict the performance of students and lectures.

Two neural network was used one network to predict the performance of lectures and one network to predict the performance of student.

6.2. Statistical technique

General data analysis for lecturers. Level of education (degree) has an impact on task performance, proficiency of work, and significance of novel ideas. An institution needs highly qualified individuals to use information technology to manage its functions. 33 subjects (that's 35.9%) held MA degree while 59 subjects (64.1%) held PhD degrees, which means that MA holders were about two thirds of the number of PhD holders. Table 1 shows subjects' years of service. There is variation in years of service with the group 1-15 constituting the biggest one. The table shows that subjects with 11 years of service or more comprise 83.7% of the sample, and that years of service corresponds with job performance as seniority gives lecturers the experience required to enable the institution to progress and improve.

Table 1. Subjects' Years of Service

Years of service	Frequencies	Percentage
Less than 5	3	3.3
5-10	12	13.0
11-15	32	34.8
16-20	20	21.7
21 or more	25	27.2
Total	92	100.0

Male subjects were 53, that is 57.6% of the sample, while female subjects were 39, that is 42.4% of the sample, with 15.2% advantage for males over females. Ages range between 36-50, which is the highest percentage 58.7% followed by 51 years or more, which comprised 31.5%. 91 subjects (98.9%) have personal computers, and all had internet service at home (100%), and 92 subjects (89.1%) had university email. Google classroom was mostly used at home with 73 subjects (79.3%) using the application there. Daily use of internet had the highest percentage, 98.1%, and 91.3% of the subjects have online classes using google classroom. 54 subjects (58.7%) have computer laboratory at the department, and 73.9% of the subject had taken a training course on using google classroom. Internet service was unavailable in classroom in 89.1% of the cases, while 84.8% of the subjects were satisfied about the use of google classroom. Finally, 52.2% participated in answering questions within google classroom.

The statistical analysis for the data

Frequencies and percentage for the questionnaire items. Table 2 summarizes the questionnaire items, frequencies, and percentage as to the use of statistical means and information technology. It shows that Google classroom offers all the technologies wanted by students and lecturers (56.5%) of the subjects – that is more than half – with standard deviation of 0.802. the table also shows a difficulty level in using google classroom of 14.1%, which is very insignificant, and standard deviation of 1.033. we noted that there is the problem of not having internet all the time which poses a serious problem in using google classroom (81.5%) and a standard deviation of 1.191, which underscores the reason for not using google classroom with seriousness. Posting material online increased the amount of studying and reduced the problems facing students and lecturers (59.8%) standard deviation of 1.143 – that's more than half – which shows that google classroom is useful in teaching and that lack of knowledge regarding technological issues leads to benefit of the use of online education (77.1%). This means that there is a positive correlation between lack of knowledge of technical matters and decrease in the use of online education and vice versa, with standard deviation of 0.793. 23.9%, with standard deviation of 0.932, stated that google classroom does not provide instant help or direct response, but this is a small percentage that should not be counted when assessing the level of technical support offered by google classroom. 56.2% said that not having computers at classroom lessens motivation for learning, which means that having more computers will improve motivation for online education and learning. 40.5%, with standard deviation of 0.797, stated that google classroom allows for the use of other computer programs, while 65.2%, with standard deviation of 0.862, stated that using class code was sufficient to log into google classroom. Finally, 35.8%, with standard deviation of 0.884, think that google classroom is not a comprehensive program for students and teachers.

Table 2. It shows frequencies and percentages of questionnaire items related to use of statistical means and information technology

Item	completely agree		Agree		To some extent		Disagree		Completely disagree	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Q1	8	8.7	44	47.8	36	39.1	1	1.1	3	3.3
2	1	1.1	12	13.0	24	26.1	31	33.7	24	26.1
3	47	51.1	28	30.4	8	8.7	1	1.1	8	8.7
4	14	15.2	41	44.6	19	20.7	10	10.9	8	8.7
5	35	38.0	36	39.1	20	21.7	1	1.1	0	0.0
6	6	6.5	16	17.4	49	53.3	15	16.3	6	6.5

Median and standard deviation. Table 3 shows the median and standard deviation of the questionnaire items, whether the response median reached 3 or not. When the median value is larger than 3, this means that the sample is positive (agree or completely agree) regarding the item. Table 3 shows that median for all items ranged between (2.26-4.14).

Table 3. It shows Median and Standard Deviation

Questions (questionnaire)	Median	Standard Deviation
question 1	3.58	0.802
2	2.29	1.033
3	4.14	1.191
4	3.47	1.143

General data analysis for students. Subjects holding higher diploma were 42 (33.1%) while subjects holding master degree were 85 (66.9%), giving the latter a 33.8% advantage. Males were 83 (65.4%) and females were 44 (34.6%) – a 30.8% difference in favour of males. For age, the (23-35) group represented the higher percentage (79.5%), followed by (36-50) which represented (18.9%) and (more than 51) group, (1.6%). 117 of the subjects, (92.1%), owned personal computers, (96.9%) had internet at home, and 70 (55.1%) had university e-mail. 91 subjects (71.7%) used Google classroom while at home, and 98.4% used internet daily. Most subjects (92.1%) had online classes within Google classroom. Subjects who had computer lab at the department were 125 (98.4%) and subjects who did not get a course on Google classroom were (92.1%), however, they had previous knowledge of using Google classroom. Internet was not available at classroom in (92.1%) of the cases, (81.1%) of the subjects were satisfied with using Google classroom, while (81.1%) participated in answering questions within Google classroom.

Frequencies and percentages for questionnaire items. Table 4 summarizes questionnaire items frequencies and percentages related to use of statistical means and information technology. It shows that 38.6% of the subjects stated that Google classroom provided all technologies wanted by students and teachers, with a percentage of 48.8% and standard deviation of 0.950.the table also shows that 36.2% didn't find difficulty in

using Google classroom applications while neutral subjects percentage was 33.9%, which does not affect its use by all subjects, with standard deviation of 1.109. 62.0% found that not having internet permanently is a serious problem, standard deviation 1.128, while 54.3%, with standard deviation of 0.887, found that online classes increased the amount of studying and reduced the amount of problems facing students and teachers, which shows that Google classroom benefits teaching. 63.8% with standard deviation of 1.05 believed that lack of knowledge of technological aspects reduces benefit of technical education, which means that there's a positive correlation between lack of knowledge of technology and decrease of benefit of online education and vice versa. 30.7% with standard deviation of 0.977 believed that the technical support offered by Google classroom does not provide instant help or direct response. This percentage is small, less than third, and consequently does not really undermine the level of technical support provided by Google classroom. 63.8% thought that not having enough computer in class reduces motivation for learning through Google classroom. This means that providing more computers will improve motivation for online learning. 27.5% with standard deviation of 0.856 think that Google classroom environment allows for the use of other computer programs. 66.9% - more than the half – think that using the class code is sufficient to log into online Google classrooms and identifying the user. A small percentage, 29.9% with a standard deviation of 0.979, think Google classroom is a complete program for lecturers and students.

Table 4. It shows frequencies and percentages of questionnaire items related to use of statistical means and information technology

Item	completely agree		Agree		To some extent		Disagree		Completely disagree	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Q1	18	14.2	31	24.4	62	48.8	12	9.4	4	3.1
2	10	7.9	28	22.0	43	33.9	32	25.2	14	11.0
3	48	37.8	35	27.6	34	26.8	2	1.6	8	6.3
4	23	18.1	46	36.2	50	39.4	6	4.7	2	1.6

Median and standard deviation. Table 5 shows the median and standard deviation of the questionnaire items, whether the response median reached 3 or not. When the median value is larger than 3, this means that the sample is positive (agree or completely agree) regarding the item. Table 5 shows that median for all items ranged between (2.53-3.94).

Table 5. It shows Median and Standard Deviation

Questions (questionnaire)	Median	Standard Deviation
question 1	3.37	0.950
2	2.91	1.109
3	3.89	1.128
4	3.65	0.887
5	3.84	1.057
6	3.17	0.977

7.   Conclusions

1. Data mining technique is very helpful tools in studying academic performance
2. Deep learning is useful in classification performance but it lake the show of classification rule to understanding how the variable is effect in the classification
3. It shows that Google classroom offers all the technologies wanted by students and lecturers they were satisfied about the use of google classroom.
4. we noted that there is the problem of not having internet all the time which poses a serious problem in using google classroom
5. Posting material online increased the amount of studying and reduced the problems facing students and shows that google classroom is useful in teaching
6. lack of knowledge regarding technological issues leads to benefit of the use of online education. This means that there is a positive correlation between lack of knowledge of technical matters and decrease in the use of online education and vice versa,
7. stated that google classroom does not provide instant help or direct response, but this is a small percentage that should not be counted when assessing the level of technical support offered by google classroom.
8. that not having computers at classroom lessens motivation for learning, which means that having more computers will improve motivation for online education and learning.
9. stated that google classroom allows for the use of other computer programs, stated that using class code was sufficient to log into google classroom. more than the half – think that using the class code is sufficient to log into online **Google classrooms and identifying the user.**

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