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Identifying the Factors Influencing the Development and Application of Cloud Computing to Enhancement of Efficiency of Education

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ABSTRACT

The purpose of the present research is to identify the factors affecting the development and application of cloud computing in order to increase the efficiency of education. The research method is qualitative-quantitative exploratory. The sample size is 272 people. For data analysis, structural equation modeling and exploratory factor analysis were used using SPSS-v21, Smart Pls-v2 and Lisrel-v8 software and Grenard theory. The results obtained in the proposed model showed that among the 16 available indicators for the application and development of cloud computing, five main components are identifiable: the development of a training system tailored to the organization's development, updating, and educational system, obtaining necessary licenses and using cloud computing specialists. Out of the 43 extracted indicators, three main components were identified for training efficiency, which include individual, educational and complex components.

1. Introduction

The importance and necessity of understanding the factors influencing the application of cloud computing is that it provides a variety of essential hardware and software applications such as applications, storage, processing, and virtual servers on the web media [1]. Therefore, identifying the developer's factors will determine its application path and reinforce its trust in using it for the user. As a result, scalability and lack of need for extensive investment in expensive and licensed hardware justify and provide significant benefits to the organization. According to Forster's research firm, cloud computing is a large number of controlled and measurable infrastructure that has the ability to host applications, and the customer of the service,

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according to its use, pays for the cost of services, and in the form of Generally, it changes the structure and nature of the organization's data systems and, in particular, changes the development of telecommunications [2].

In this regard, e-learning can use cloud computing to provide the required infrastructure as well as provide an appropriate context for improving efficiency, scalability and increased access [3]. In recent years, educational organizations have begun using the same benefits for agility as their activities have started. Nevertheless, Cao emphasizes that organizations must be seriously evaluated before using cloud computing.

Although many benefits have been reported in the use of cloud computing, there are many risks associated with the implementation, management and use of this technology [4]. However, in cloud computing, apart from the traditional computing model in which users control complete data storage and computing, it is necessary for physical cloud management of data and machines to be provided to cloud computing providers. Therefore, the accuracy of data storage and computing may be compromised due to lack of control of the owners on the security of the data. Therefore, before any activity in the field of cloud computing, security, confidentiality, compliance with the rules and hosting of other risks should be carefully monitored prior to any activity in the field of cloud computing. In summary, the benefits of cloud computing can be cited as cost savings, scalability, data storage, performance and reliability, and resource sharing [5].

These benefits enable cloud computing to flexibly change resources at the same time as demand for services changes. In this way, huge companies that have the ability to create the necessary infrastructure and investments, will sell the computer and save the software and other services online [6].

The purpose of this study is to determine the factors influencing the application of cloud computing technology, which can change the way organizations access and use the products and services of data and communication technology, to enable them, in particular, educational institutions. To make optimal choices between ownership and management of its products and services and outsourcing approach.

Some researchers believe that instead of the traditional approach in which hardware, software, and support services are tailor-made for the organization, administrators can use their cloud computing services to meet their ICT needs using cloud computing services [7-8].

Cloud computing has countless uses in education. For example, in an environmental pollution lesson plan, the inclusive educator wants to find examples and examples of people's lack of environmental awareness until next week, while taking photos and videos with their phones and touch screens in the exclusive atmosphere of the teacher to share.

The learners, while contributing to the production of this content, provide their professors with ease and in the shortest time [9]. By removing the paper-based system in the training centers and universities and transferring it to cloud computing and clouds, a new step is taken to better and better education. You can use web servers and cloud software alongside classroom textbooks and classrooms. Educational organizations have little expense for smarting and electronic zing their infrastructure at infrastructure level [10]. Therefore, during the night or on holiday, these facilities cannot be used and the cost of maintaining the site and computer systems, installation and technical support of software packages also cost these centers [11]. So, in the present research, we answer the following question: What factors affect the development and application of cloud computing to increase the efficiency of education?

1.1. Cloud computing

Cloud computing is a new paradigm that can provide the infrastructure needed to help institutions run applications as a proper service through a web browser on the Internet. The emergence of this concept dates back to the 1950s. John McCarthy said in 1961, "Computations may once again be organized in the same way as general tools, and help shape the use of cloud computing" [12]. As defined by the World Institute for Standardization and Technology, Cloud Computing is a model for providing easy access to the user's demand through the network to a set of flexible and configurable computing resources such as networks, servers, storage space, applications and services.; So that access can be quickly released or released with the least need for resource management or the need for direct involvement of service providers [13]. Cloud computing is a computer model that tries to facilitate user access based on the type of demand that comes from information and computing resources. This model tries to meet the needs of users with the least need for human resources and reduce costs and increase the speed of access to information. Since this technology is now in its infancy, the standard scientific standard is still universally accepted. It has not been provided, but most scholars have spoken on parts of the definition of this phenomenon. In [9, 10] state that cloud computing is a model for providing easy access based on the user's demand through the network to a set of configurable, configurable, computing resources (such as networks, servers, storage space, Applications and services) that can be accessed or released free of charge with the least need for resource management or the need for direct service provider interference. The word cloud is a metaphor that refers to the Internet, and in the graphs of computer networks, the cloud form is used to represent the Internet. The reason the Internet is so cloudy is that the Internet, like a cloud, hides its technical details in the eyes of users, creating a layer of abstraction between these technical details and users. For example, what a cloud computing software provider provides is online business applications that are provided to users through a web browser or other software. Applications and information are stored on servers and are available to users upon request. Details are hidden from the user's perspective, and users do not need expertise or control over the cloud infrastructure technology they use.

Generally, cloud computing consumers do not own cloud-based physical infrastructure, but they lease it out of third-party suppliers to avoid capital spending. They use resources in the form of a service and only pay for the resources they use. Many of the cloud computing services provided by the use of the general computing model make it possible to use these services in a similar way to the public utilities (such as electricity) [11]. This is while other types of suppliers offer their services or subscribe to their services. The sharing of "consumer and intangible" computing power among several tenants can improve the productivity rate, because in this way, other servers will not be idle for no reason (which will significantly reduce costs, while now that the speed of application development and development is increasing). A side effect of this approach is that computers are used to a greater extent because cloud computing customers do not need to calculate and set the ceiling for their maximum load [12].

In [13] believe that service management is at the forefront of cloud processing. Cloud services must be either architecture or designed to be able to share resources, leased-to-companies, and these organizations are able to share the same resources. Also, according to [14] it must be able to handle data accurately and reliably during transfer, and also be flexible, such as when power outages occur. Cloud computing has to offer some features such as reliability, security, and the ability to manage and manage the world of change.

1.2. Cloud computing services

The services offered in the cloud computing model are very broad. Different providers have been offering a variety of different services to different users. Nevertheless, the services provided can be classified into three main categories [8].

Software as a Service: In this service, a series of software applications is provided to users on the provider's side, provided to users.

The framework as a service: This service provides a series of software development and development facilities for the application. This service includes software development, development, testing and maintenance of software as well as databases [11].

Infrastructure as a service: In this service, the hardware facilities such as the server, memory, network, bandwidth, processor, etc. are provided to the user.

2. Related works

In explored the students' understanding of cloud computing in a classroom. In this study six models were considered: service quality, self-efficacy, motivational model, acceptance model technology, rational theory of theory, or the theory of planned behavior, and the theory of innovation in the field of using cloud computing as components in hypotheses Research in the classroom was dealt with. The research was quasi-

experimental and the sample was 478 subjects in 16 classes that were selected by random cluster sampling. The results showed that all six models have sufficient explanatory power for this technology. Also, the statistics explaining the importance of rating from theoretical models and the size of impact and prediction illustrate the efficiency of the models [14-15].

In reviewed the technical and environmental factors affecting the acceptance of cloud computing in the South African public sector. In this research, 51 experts from 40 organizations in the public sector of South Africa were interviewed using a Delphi method and a questionnaire. Findings indicate that most respondents were concerned about privacy, and this factor was ranked first. Environmental factors such as learning pressure, resilience to change, lack of security, etc., have also been influenced by the adoption of a cloud computing implementation strategy as a provider of legal solutions to the use of cloud computing [16].

In examines the organizational and economic factors affecting the development of cloud computing in the Chinese market. In this study, the importance of various economic relationships as well as formal and informal institutions in the development and use of cloud computing in China's organizations was examined. The research, based on surveys and surveys, has four goals of government agencies to use cloud computing, the impact of exposing market data in the network, the cost of services, and the need for education. The findings showed that there was a fear of disclosure of data (48%), government pressure on using cloud computing (31%) and training need (13%), and software cost and support (8%) in rankings 1 Up to 4 [17].

In examined the effects of data technology capabilities and delivery models on the success of cloud computing and enterprise performance for cloud computing processes and support. Data was collected from a sample of 302 organizations. The results showed that the data technology capabilities are more effective than the technical capabilities of data technology management on the success of cloud computing. Similarly, an assessment of interrelations shows that a public and combined cloud delivery model may be more dependent on communication capabilities for cloud success, while the flexibility and agility of the public cloud also influences the performance of the company [16-18].

In examined the determinants of using cloud computing services in small and medium-sized companies in Latvia. The data was compiled from 150 employees who were senior managers and senior managers. The results indicate that the process of streamlining the internal data flow is modest compared to most European countries. The results of the data, compared with the results of previous researchers, show a positive trend in the development of cloud computing services in the service provider context. Similarly, the results indicate that there are infrastructure and software platforms for the provision of services [18].

3. Methodology of research

Since the present research is about the illiteracy of factors influencing the development and application of cloud computing in order to increase the efficiency of education, the research methodology is applied in terms of purpose, applied; based on the type of data, qualitative-quantitative combination of the type of exploration, in terms of data collection, cross-sectional and the data collection method or the nature and method of the research is descriptive-correlational [5-10].

As we said, the present study is based on the type of mixed data of the type (qualitative-quantitative), which in this method, by examining different aspects of qualitative and quantitative methods and combining these two possibilities, can be provided to answer research questions in different fields. Since in this research the main purpose of identifying the factors influencing the development and application of cloud computing is to increase the efficiency of education, in order to in-depth study and understanding of the subject in the field of factors affecting the development and application of cloud computing, as well as understanding the dimensions, components and performance indicators of education, first To study the literature and background related to the subject, then the interview and method of content analysis as a research technique for further understanding and identifying the indicators and components as well as the factors influencing it were considered. Based on this, a questionnaire was developed and, subsequently, a quantitative approach for confirmation Qualitative and test results Dell has been used. The method of data analysis in the qualitative section is based on the data approach of the foundation and theoretical coding. Theoretical coding is the operation in which data are analyzed, conceptualized and newly introduced together, and is the main process in which the theory is developed based on data. The coding steps used in this study include open and axial coding, and in the small part, structural equation modeling was used [10-12].

The statistical population of this research in the qualitative section was composed of 30 individuals (21 Ph.D., 9 Master's) from the scientific and experimental elite of cloud computing and education. Using a targeted sampling method and considering the saturation law, the choice and the interview process in the second half of 1397, the statistical section of the research in the quantitative section includes managers and experts of cloud computing and data processing companies with a Ph.D. or Master’s degree and also have a work experience of over 20 years, which according to the companies in the city of Tehran and the number of their staff were estimated at 900 people. Estimating the sample size, using the Krejcie and Morgan table, 272 managers and experts were considered. They were selected through cluster random sampling.

Data collection tools and reliability and validity

In this research, library method, semi-structured interview and questionnaire were used to collect data.

Qualitative section: In the qualitative part of this research, semi-structured interviews were used. In individual interviews with the interviewees, three interview questions were used for preliminary examination. In addition, additional sub-questions were raised alongside each question to understand participants' experiences during the interview. During the interview, the researcher guided the questionnaire by checking the correctness of his perceptions of the interviewees' statements. The researcher analyzed the data in the process of sampling the participants so that incomplete cases can be completed by obtaining new information from the new participant. After 30 interviews, the main and secondary factors were repeated in previous interviews and the researcher reached saturation.

In order to ensure the validity of the qualitative part of the research and to ensure the accuracy of the findings from the viewpoint of the researcher, the valuable ideas of the professor’s familiar with the field of cloud computing in this field were well-informed. It was also assisted by participants in analyzing and interpreting the data. The reliability method was also used to calculate the reliability of the two encoders. In an interview with an interdisciplinary agreement, two coders were asked by professor’s familiar with coding to be involved as a secondary coder in research. The scholar together with these research partners encoded three interrogations and the percentage of agreement within the subject as an indicator the reliability of the analysis is used to calculate the reliability of the two coders, which indicates that the reliability was appropriate. Content analysis was used to analyze the qualitative data of the research. In this design, the analyzes of the collected qualitative data are done through open coding and axial coding.

A small part: In this research, a researcher-made questionnaire was used to collect the data from the interview codes which was completed by a survey of experts. The questionnaires included two parts:

A) General points: The general question is the general and demographic information of the respondents. This section contains five questions and issues such as gender, age, education, and work experience.

B) Researcher made questionnaire

Specialty items: This section includes 59 packages. In designing this section, it was tried to understand the questionnaires for the respondents as much as possible. These boxes are of a closed type and have a Likert option range of 5. It should be noted that at the time of distributing the researcher's questionnaire in the place and verbally, to clarify the content of the questionnaire and to clarify the ambiguity for the subjects has taken place. In Table 2, information is provided on the questionnaire.

Table 1. Information about the research questionnaire

Structure	Component name	Count of items	Number of items
cloud computing	Training system development tailored to the organization's development	3	1-3
	System update	3	4-6
	System training capabilities	4	7-10
	Obtaining the required permissions	3	11-13
	Using cloud computing experts	3	14-16
Training efficiency	Individual	22	17-38
	Educational	13	39- 51
	Complex	8	52-59

In order to increase the validity of the research, it was tried to design questionable questions related to the topic and for this purpose, cloud computing experts were used. Also, in this research, the validity of the questionnaire has been used for verbal and content validity methods. The research questionnaire, which was based on the results of interviews with 30 people, was provided to the supervisors and consultants and their verbal and content validity was confirmed. Since the questionnaire is designed as a Likert spectrum and is a type of attitude measure, the most suitable method for calculating validity is the Cronbach Alpha method.

Table 2. Calculate the validity and reliability of the tool

Structures	**Cronbach's alpha**	**AVE**	1	2	3	4	5	6	7	8	9	10
training system development tailored to the organization's development	0.736	0.61	0.78	---	---	---	---	---	---	---	---	---
System update	0.838	0.58	0.53	0.76	---	---	---	---	---	---	---	---
System training capabilities	0.779	0.67	0.47	0.52	0.82	---	---	---	---	---	---	---
Obtaining the required permissions	0.794	0.56	0.39	0.44	0.36	75	---	---	---	---	---	---
Using Cloud Computing Experts	0.836	0.59	0.48	0.53	0.45	0.51	0.77	---	---	---	---	---

Structures	**Cronbach's alpha**	**AVE**	1	2	3	4	5	6	7	8	9	10
Individual	0.825	0.65	0.36	0.41	0.33	0.39	0.40	0.81	---	---	---	---
Educational	0.774	0.63	0.39	0.44	0.37	0.42	0.45	0.41	0.79	---	---	---
Complex	0.861	0.59	0.53	0.58	0.56	0.55	0.57	0.48	0.51	0.63	---	---
cloud computing	0.817	0.67	0.63	0.61	0.58	0.57	0.60	0.55	0.53	0.54	0.69	---
Training efficiency	0.794	0.62	0.39	0.60	0.59	0.53	0.57	0.55	0.54	0.50	0.60	0.68

According to the table above, the reliability of the dimensions is confirmed, because the Cronbach's alpha and the composite reliability coefficient are higher than 0.7 and also AVE> 0. 5 is. Convergent validity is confirmed because CR> 0. 7; CR> AVE; AVE> 0. 5, and divergent validity is also confirmed because MSV <AVE and ASV <AVE.

Research results

In this section, research data is analyzed and evaluated using scientific methods, but before data analysis, pre-processing of data was investigated. The results showed that in some cases the loss occurred; therefore, to solve this problem, the middle method was used to plot their values, and all missing data was replaced. In order to identify the distorted data, the graph box plot was used which showed no transit data. In addition, in Excel software for the removal of indifferent people, the standard deviation of each subject was calculated in response to a questionnaire. The results showed that the standard deviation of each subject's answers to research questions was less than 0.3, and therefore no the subject was not deleted.

Qualitative section

First question: What are the factors affecting the development and application of cloud computing?

Second question: What are the indicators and components of the effectiveness of education? The analysis of the answers collected from the expert’s questionnaire will answer these two questions. It is worth noting that 30 experts in this field were interviewed based on a semi-structured interview with 3 questions. This question is answered using Grounded Theory and Exploratory Factor Analysis.

Table 3. Interview Questions

Row	Question
1	In your opinion, what factors and how can cloud computing be effective in increasing the efficiency of training?
2	In your opinion, what factors can affect the development of cloud computing in order to increase the efficiency of training
3	What is the effectiveness of training with cloud computing?

In the following tables, the checklist for the results of the analysis of the content of the interview was presented using open, pivotal and selective coding.

Data analysis of factors influencing the development and application of cloud computing began with the extraction of concepts and categories (open coding), and unrelated and repetitive concepts and categories were deleted. The results of the coding as well as the code of the interviewers, the frequency and source of each of the categories in the table Below is the following.

Table 4. List of all the extracted factors affecting the development and application of cloud computing from a semi-structured interview technique with experts and backgrounds.

Row	Initial Extraction Concepts	Code of the category	Interviewer's Code	Reference
1	Understanding the Benefits of Cloud Computing	M1	I10, I6, I5, I21, I27	[2-3]
2	support team for updating	M2	I13, I14, I15	interview
3	Identify aspects of cloud computing assistance to education	M3	I12, I5, I14, I2, I11	interview
4	Designing a training framework tailored to the needs of cloud computing	M3	I3, I4, I11, I25	[3]
5	Identifying cloud computing applications	M1	I12, I8, I30	[2-3]
6	Update feature	M2	I10, I9, I1, I18, I11	interview
7	Identify the weaknesses and the possibility of eliminating them	M2	I6, I8, I10, I17, I4	[2]

Row	Initial Extraction Concepts	Code of the category	Interviewer's Code	Reference
8	Realistic and step-by-step targeting	M1	I10, I8, I1, I23, I24	[2]
9	Utilize distance education	M3	I3, I1, I5, I14, I16	[2-4]
10	Developing distance education tailored to cloud computing	M3	I2, I6, I10, I20	[2]
11	Establishing standards for cloud computing	M4	I11, I9, I10, I14, I5	[2]
12	Provide training on the use of cloud computing systems	M5	I6, I1, I21	[2]
13	Rating of cloud computing systems	M4	I11, I7, I10, I3, I10	[2]
14	Applying cloud computing software to the specialized training area	M4	I8, I3, I15, I12, I22	[2]
15	Easy learning	M5	I12, I3, I2, I8, I21	[2-3]
16	Educational support momentarily	M5	I13, I9, I5, I4, I12	[2-3]

Based on the concepts and categories in the table above, the field of coding was provided. In the central coding relationship between the concepts and related categories are communicated. The pivot encoding contains 5 stories and each of the classes contains its own classes and concepts. These classes are identified from axes A through E in the table below.

As the results of the previous table showed, in the third step, the coding process of the collected data, the final sorting and clustering of all concepts and axial codes in the 5th floor took place. In the final stage of the current qualitative analysis process, the findings from analyzing the analysis were centered around the main goal, and by linking the codes (open coding), the concepts (axial coding) were identified. The derived classes around the development and application of cloud computing in increasing the efficiency of training are visible in the following table.

Table 5. Final coding resulting from semi-structured interview technique

Component	Extractive concepts	Code of the category
Develop a training system tailored to the organization's development	Understanding the Benefits of Cloud Computing	A1
	Identifying cloud computing applications	A1
	Realistic and step-by-step targeting	A1
System update	Update feature	A2
	Identify the weaknesses and the possibility of eliminating them	A2
	Support team for updating	A2
System training capabilities	Designing a training framework tailored to the needs of cloud computing	A3
	Identify aspects of cloud computing assistance to education	A3
	Utilize distance education	A3
	Developing distance education tailored to cloud computing	A3
Obtaining the necessary permissions	Establishing standards for cloud computing	A4
	Rating of cloud computing systems	A4
	Applying cloud computing software to the specialized training area	A4
Use Cloud Computing Experts	Provide training on the use of cloud computing systems	A5
	Easy learning	A5
	Educational support momentarily	A5

In identifying the factors affecting the development and use of cloud computing in education, one must first be sure that the available data can be used for analysis, that is, whether the number of data (sample size and the relationship between Variables are suitable for factor analysis? For this purpose, the KMO index and

Bartlet test were used. The results showed that the KMO index is greater than 0.6 and represents almost equal to one, indicating the adequacy of the sample size based on the indicators identified for the factor analysis. The significance level of 0.000 for Bartlett's test also indicates the suitability of the research variable for factor analysis, since the assumption of the integrity matrix is rejected. As mentioned above, identification of factors influencing the development and use of cloud computing in education based on the results of the qualitative and content validity section, was performed on 16 identified indicators of exploratory factor analysis. The subscription table for all indicators was above 0.5 and did not require any questions. The following table also shows the variance of the whole.

Table 6. Explaining the variance of components

Factors	Special initial values			Total squared extracted loads			Total square of rotated loads		
	Total	Variance	The cumulative percentage	Total	Variance	The cumulative percentage	Total	Variance	The cumulative percentage
1	.13 365	752 .60	752 .60	.13 365	752 .60	752 .60	405 .8	203 .38	203 .38
2	418 .1	445 .6	197 .67	418 .1	445 .6	197 .67	379 .6	994 .28	197 .67
3	344 .1	109 .6	306 .73	344 .1	109 .6	306 .73	481 .5	384 .10	581 .77
4	257 .1	714 .5	020 .79	257 .1	714 .5	020 .79	841 .3	719 .4	300 .82
5	144 .1	200 .5	220 .84	144 .1	200 .5	220 .84	466 .2	920 .1	220 .84
6	558 .0	536 .2	756 .86						
...									
16	017 .0	076 .0	100						

According to the above table, the first five factors have special values larger than one and remain in the analysis. These factors account for approximately 84% of the variance of factors affecting the development and application of cloud computing in education. In order to investigate the nature of the relationships between variables and to achieve the definitions and naming of agents, coefficients above 0.4 are important and meaningful in defining the factors, and coefficients less than these limits are considered as random factors. For the interpretation of the factors, this coefficient will be used at a value of 0.40. The pebble chart confirms the above results and shows that the same five factors were identified.

In the following tables, the checklist for the results of the content analysis of the interview on the effectiveness of training is presented using open, axial and selective coding. Data analysis was started by extraction of concepts and categories (open coding) and unrelated and repetitive concepts and categories. The results of coding as well as the code of the interviewers, the frequency and source of each of the categories are listed in the table below.

Table 7. List of all extracted concepts Effectiveness of training by semi-structured interview technique with experts

Row	Initial Extraction Concepts	Code of the category	Interviewer's Code	Reference
1	To attract human resources, it has a certain strategy.	M1	I1, I5, I10	[5-7]
2	Being patient at the courses held;	M2	I1, I7, I3, I4	[8-10]
3	Interest in employees;	M3	I1, I9, I10, I5	[11]
4	The confidence of employees in using trained cases;	M4	I3, I5, I1	[12]
5	Flexibility of staff after training;	M5	I2, I7, I10	[8-11]
6	Creating the opportunity to apply and respond to courses held by	M6	I2, I7, I5	[9,10]
7	Creating a desirable administrative system for holding appropriate training courses for employees	M7	I6, I8, I2, I3, I6	[6-8,12]
8	It is encouraged and encouraged when officials and employees are presenting a new idea.	M8	I3, I7, I9, I4	[5-7]
9	Usually, ideas that have not been tested before are discussed.	M9	I8, I10, I3	[9-11]
10	In this, the continuous emphasis on the development of specific products and services is emphasized.	M10	I8, I10, I3	[10-12]
11	The board is fully aware of the risks of innovation.	M11	I3, I7, I9, I4	[10-12]
12	Creating facilities and ... for staff attending training courses	M12	I2, I9, I10	[10-12]
13	Provide effective educational services by organizers of training courses	M13	I1, I6, I9	[10-12]
14	Use of information and communication technology to hold training courses;	M14	I1, I7, I3, I5	[10-12]
15	Rate of participation with others;	M15	I2, I3, I10	[10-12]
16	Sharing information and skills by employees;	M16	I2, I9, I1	[10-12]
17	It has production targets and will be at the end of the year.	M17	I8, I10, I3	[10-12]
18	At least one exam has been taken from me for my duties.	M18	I1, I8, I4, I5	[8-10]
19	Sample employees are rewarded during each period.	M19	I4, I5, I8, I7	[4-6,9]
20	The training that I have seen for my duties is different from that of another person in another.	M20	I4, I7, I8, I9, I1, I10	[4-6,9]

Row	Initial Extraction Concepts	Code of the category	Interviewer's Code	Reference
21	Human resource performance is measured according to defined standards.	M21	I5, I9, I11	[10-12]
22	In-service classes are held to develop human resource abilities.	M22	I4, I8, I6, I5	[10-12]
23	Management is not an appropriate mechanism for maintaining experienced and skilled personnel.	M23	I4, I7	[10-12]
24	Manpower management has implemented mechanisms to develop the ability of employees, but they have not been functional yet.	M24	I2, I3, I7	[8-10]
25	I see displacements that have no particular justification.	M25	I3, I7, I1	[7-9]
26	Payments to me are based on my performance.	M26	I1, I5, I7, I8, I10	[7-9]
27	Has a developmental capability.	M27	I3, I7, I9, I1	[7-9]
28	Enjoy strong beliefs;	M28	I5, I6, I2	[10-12]
29	The relevance and usefulness of educational content;	M29	I1, I8, I1	[8-10]
30	Metacognitive perspective on employees;	M30	I8, I10, I2, I5	[10-12]
31	Identify the needs of the professionals by holding training courses	M31	I3, I9, I1, I7	[10-12]
32	Simulation and behavioral modeling of courses held for employees;	M32	I3, I9, I11, I5	[10-12]
33	Evaluation of staff response to training courses;	M33	I1, I6, I3	[8-10]
34	Assessing Behavioral Changes in Employee Jobs;	M34	I7, I10, I1	[7-9]
35	Identify the key results of training courses;	M35	I4, I6, I2, I5	[10-12]
36	Usually, in this initiative, it receives an appropriate response; therefore, individuals are motivated to provide new ideas.	M36	I8, I10, I3, I2	[10-12]
37	New products and services are often seen by customers as new and innovative products and services.	M37	I5, I1, I4	[8-10]
38	In this, the continuous development of products has been changed so that they can quickly enter new emerging markets.	M38	I7, I9, I2, I5	[10-12]
39	The role of changing the values, attitudes, skills and knowledge of the staff after the implementation of training courses	M39	I5, I7, I12, I8	[8-10]

Row	Initial Extraction Concepts	Code of the category	Interviewer's Code	Reference
40	Customers are offered more innovative products than competitors.	M40	I7, I1, I5	[10-12]
41	New products and services are developed quickly according to market requirements.	M41	I4, I5 I2, I3,	[10-12]
42	In this, officials and employees have the opportunity to step into unknown areas.	M42	I4, I5 I2, I3,	[8-10]
43	In introducing new products and services, we are often the first supplier to market.	M43	I5, I4	[8-10]

In the pivotal coding relationship between the concepts and related categories is also communicated. The pivot encoding of this section is composed of 4 floors, each of which has its own classes and concepts. In the final stage of the current qualitative analysis process, the findings from analyzing the analysis were centered around the main goal, and by linking the codes (open coding), the concepts (axial coding) were identified. The following classes are visible around the training efficiency in the following table.

Table 8. Final coding resulting from Semi-structured interview technique

Component	Initial Extraction Concepts	Code of the category
Individual factors	Staff cognitive ability;	B1
	Employee self-efficacy;	B1
	Motivation for employee learning;	B1
	Willingness to transfer staff if needed;	B1
	Personnel duties;	B1
	The sense of responsibility in the duties and responsibilities assigned to employees;	B1
	Commitment to professional ethics;	B1
	Understanding the value of education from the perspective of employees;3 b	B1
	Planning for training by managers;	B1
	Enjoy strong beliefs;	B1
	Being patient at the courses held;	B1
	Interest in employees;	B1
	The confidence of employees in using trained cases;	B1
	Flexibility of staff after training;	B1
	High precision in staffing after training courses;	B1
	The speed at which employees work after training;	B1
	Having discipline and perseverance in the staff;	B1
	Regular work in the staff after training;	B1

Component	Initial Extraction Concepts	Code of the category
	Employee social relations;	B1
	Rate of participation with others;	B1
	Sharing information and skills by employees;	B1
	Delegation to subordinates by directors;	B1
Educational factors	Educational Needs Assessment of Managers;	B2
	Staff learning power;	B2
	The purpose of training staff;	B2
	The relevance and usefulness of educational content;	B2
	Metacognitive perspective on employees;	B2
	Designing curriculum planners;	B2
	Skills and learning in action for employees;	B2
	Simulation and behavioral modeling of courses held for employees;	B2
	Evaluation of staff response to training courses;	B2
	Assessing Behavioral Changes in Employee Jobs;	B2
	Identify the key results of training courses;	B2
	Elaboration of Educational Standards and the Model of Educational Effectiveness Measurement by MSI;	B2
	Use of information and communication technology to hold training courses;	B2
Complex factors	Supporting senior managers from training courses for employees;	B3
	Calculation of Return on Capital held by	B3
	Creating the opportunity to apply and respond to courses held by	B3
	Creating a desirable administrative system for holding appropriate training courses for employees	B3
	Identify the needs of the professionals by holding training courses	B3
	The role of changing the values, attitudes, skills and knowledge of the staff after the implementation of training courses	B3
	Creating facilities and ... for staff attending training courses	B3
	Provide effective educational services by organizers of training courses	B3

In identifying training efficiency components, the results of the KMO test indicate the adequacy of the sample size based on the identified indicators for factor analysis. The significance level of 0.000 for Bartlett's test also indicates the suitability of the research variable for factor analysis, since the assumption of the integrity matrix is rejected. As mentioned above, identifying the efficiency components of education based on the results of the qualitative and content validity section, on 43 identified indicators, exploratory factor analysis was performed. The subscription table for all indicators was above 0.5 and did not require any questions. The following table also shows the variance of the whole.

Table 9. Explaining the variance of components

Factors	Special initial values			Total squared extracted loads			Total square of rotated loads		
	Total	Variance	The cumulative percentage	Total	Variance	The cumulative percentage	Total	Variance	The cumulative percentage
1	.39 10	45 .51	45 .51	.39 10	45 .51	45 .51	.40 60	62 .45	62 .45
2	15 .3	14 .4	59 .55	15 .3	14 .4	59 .55	27 .3	67 .6	29 .52
3	18 .2	87 .2	46 .58	18 .2	87 .2	46 .58	27 .2	43 .4	72 .56
4	69 .1	23 .2	69 .60						
5	99 .0	30 .1	99 .61						
6	98 .0	29 .1	28 .63						
7	97 .0	28 .1	55 .64						
8	96 .0	26 .1	82 .65						
9	95 .0	25 .1	07 .67						
10	94 .0	24 .1	30 .68						
⋮	⋮	⋮	⋮						
42	06 .0	07 .0	94 .99						
43	05 .0	06 .0	100						

According to the table above, the first four factors have special values larger than one and remain in the analysis. These factors explain the variance of educational efficiency indicators by approximately 61%. In order to investigate the nature of the relationships between variables and to achieve the definitions and naming of factors, coefficients above 0. 4 are important and meaningful in defining the factors, and coefficients less than these limits are considered as random factors. For the interpretation of the factors, this coefficient will be used at a value of 0.40. The pebble chart confirms the above results and shows that the same four factors were identified. As shown in Table 10, the Chi-squared t and RMSEA indices show that the modified model provides a better fit for data.

Table 10. Fit Parameters of Model Path Analysis

Index name	Fit indices	
	Value	Limit
Chi-square/df	14 .2	Less than 3
RMSEA (root mean estimated error)	051 .0	Less than 0. 1
CFI (Adjusted Fitness)	98 .0	Larger than 0. 9
NFI (softened fit)	96 .0	Larger than 0. 9
GFI (goodness of fit)	93 .0	Larger than 0. 9
AGFI (Good Modified Fit)	91 .0	Larger than 0. 9

As we can see, the fitting indices of the model are in a favorable position. It is worth noting, according to a study in the literature of history, each of its identified dimensions includes components that comprise the

indicators of each dimension. In the following figure, estimates of the standard coefficients of the paths along with the factor load of each variable are given.

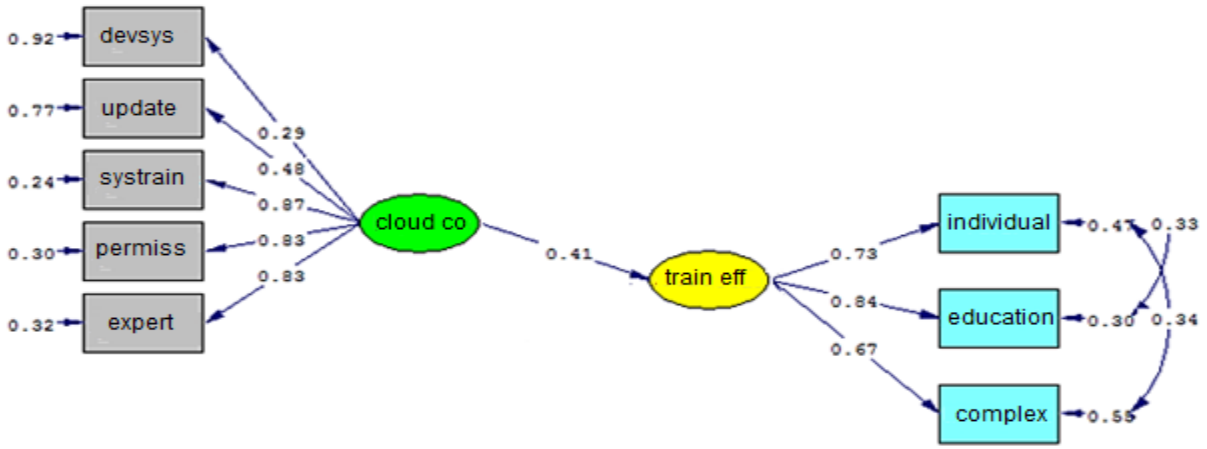

Figure 1. Structural model of research in the mode of estimating standard coefficients

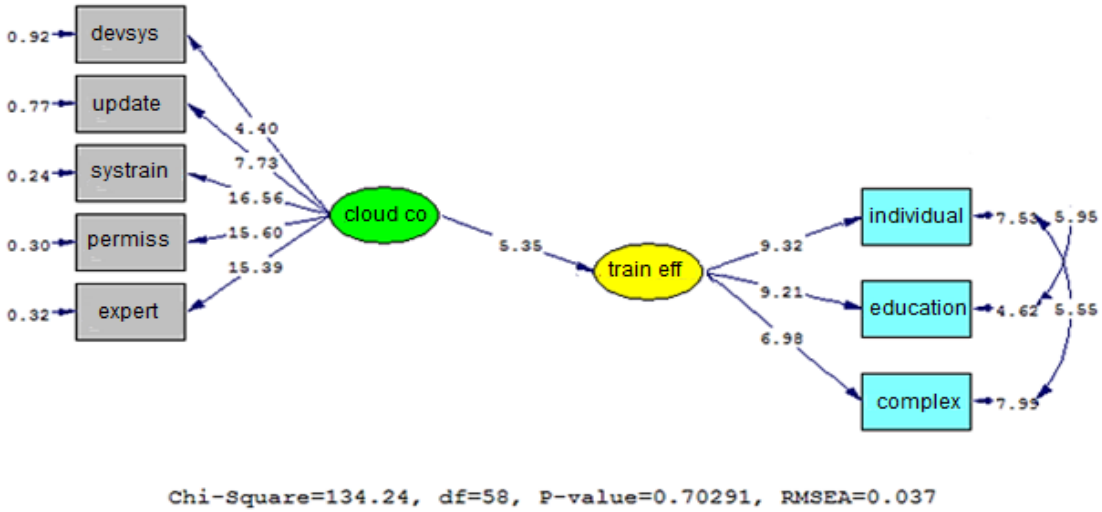

Figure 2. Structural model of research in the meaningful state of coefficients

As shown in the above figures, all parameters of the model, along with path coefficients and meaningful values, are shown in summarized form in the table below.

Table 11. Model Estimates

Route			Path coefficient	T value	Condition
Cloud computing	←	Training efficiency	0.41	5.35	Accepted

Route			Path coefficient	T value	Condition
Develop a training system tailored to the organization's development	←	Cloud computing	0.29	4.40	Accepted
System update	←		0.48	7.73	Accepted
System training capabilities	←		0.87	16.56	Accepted
Obtaining the necessary permissions	←		0.83	15.60	Accepted
Use cloud computing experts	←		0.83	15.39	Accepted
Individual	←	Training efficiency	0.73	9.32	Accepted
Educational	←		0.84	9.21	Accepted
Complex	←		0.67	6.98	Accepted

Therefore, according to the above, it is concluded that there is a significant (positive) relation between cloud computing and improving the efficiency of education.

4. Discussion and Conclusion

In identifying the factors affecting the development and development of cloud computing as well as the performance components of training, the results showed that among the 16 available indicators for the application and development of cloud computing, five main components are identifiable: the development of a proportional education system With the development of the organization, updating, training system abilities, obtaining the necessary permissions and the use of cloud computing specialists. Subsequently, with 43 extracted indicators, three main components were identified for educational efficiency, which include individual, educational and complex components.

Many businesses have been focusing on technology-based structures based on the different needs that they have found at different times in order to provide services to their customers, and the various capabilities that the IT platform provides to them. Has created and developed numerous data that the most important consequence of this process can be the creation of various and often interconnected and interlinked systems that increase the complexity of the management of enterprise data technology and the challenges of development new applications of data-driven technologies. While the development of a training system tailored to the organization's development, updating, system training capabilities, obtaining the necessary permissions, and the use of cloud computing professionals, educational clients enable these services to be free of technical requirements and challenges. Changes in IT-based structures, such as system interference

and the costs of using the new platform, are based on cloud computing services and applications, and focused on managing educational processes and focusing more on training performance improvements.

Today, executives face a major challenge in organizations, seeking to find a way to invest in new technologies in order to communicate with the client and, at the same time, to balance with unproductive costs outside the realm. To be A growing approach to cloud computing can play a big role in helping educational managers balance their costs and become an organizational opportunity. Therefore, today, administrators can use their cloud computing technology to spend more on their educational facilities. School principals are responsible for the security and reliability of their data, and to ensure that the necessary provisions are observed in all activities related to the data of each organization, there must be rigorous and complex bureaucracies that slow down the exchange of information., In the organization. Therefore, it is suggested that experts, using appropriate studies on cloud computing technology and familiarity with its different dimensions, can apply applied strategies to improve the efficiency of education.

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