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**Experts perceptions of cloud based e-learning system in
India**

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MBA- Cloud computing
May, 2015
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Declaration

I declare that this dissertation is entirely my own, and unaided work except as indicated in the references.

It is being submitted in partial fulfillment of the requirements for the degree of Master of Business Administration in Cloud Computing at Dublin Business School, Dublin.

Further, no portion of the work referred to in the dissertation has been submitted in support of an application for any other degree or qualification or any other university or other institute of learning.

Suman Kishtadi

Date: 20th May 2015.

Place: Dublin, Ireland.

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Acknowledgement:

This research has developed out of my ongoing desire for the advancements in the field of cloud based e-learning systems and also theory lying behind them.

Firstly, I might want to thank my mentor, Ms. Brid Lane. Brid's recommendation and support have been important all through the dissertation process.

I am thankful to all my lecturers at Dublin Business School, who have made my learning experience at the college a rich and enjoyable experience.

I also express my sincere gratitude to the interviewees for their valuable support and Knowledge provided to me in the e-learning field.

Finally, I would like to thank my family who stood by and supported me all through this process.

Abstract:

The massive proliferation of affordable computers, Internet connectivity and rich educational content has bent a global phenomenon in which information and communication technology (ICT) is being used to transform teaching and learning experience. Hence, there is a requirement to redesign the educational system to better meet the requirements. Cloud computing technology in education gives improved choice and flexibility. The software and platform in education can be off-premises, on-premises or a combination of both, depending on the educational institution's needs. Much of the existing research on cloud based e-learning in India is very much academic. The primary goal is to find what is experts point of view on key features that influencing cloud based e-learning in educational institutions in India. The objectives are to find out the unique benefits and drawbacks of implementing cloud based e-learning systems for educational institutions in India. Subsequently, this study leads to understand that cloud based e-learning will not only benefit to the existing educational institutions but even the start-up educational institutions. Despite the fact that cloud based e-learning is effective, these cloud computing services reduce the cost than the traditional method of e-learning systems for educational institutions.

The study followed an inductive approach using qualitative methods of research. The author analyses the key feature that influences cloud based e-learning in educational institutions in India and conclusions are drawn from the interviews conducted. Also, this study will bring more lights on, why start-up educational institutions should implement cloud based e-learning systems. Furthermore, this study will show the future shift in cloud based e-learning systems, which is currently used by few colleges and universities in India.

1. Introduction:

“E-learning is defined as learning facilitated and supported through the use of information and communications technology” Pachler, N. And Daly, C (2011, p. 15), e-learning may involve the use of the following technologies

- Desktop and laptop computers
- Software, including assistive software
- Interactive white boards
- Digital cameras
- Mobile and wireless tools, including mobile phones
- Electronic communication tools including email, discussion boards, chat facilities and video conferencing
- Virtual learning environments (VLEs)
- A learning activity management systems

E-learning can cover a range of activities from supporting learning to the blended learning, to learning that is delivered entirely online. Whatever the technology; however, learning is the vital element (Pachler and Daly, 2011, p. 15). E-learning is not simply associated with the distance learning or remote learning, but forms part of a conscious choice of the best and the most suitable ways of promoting effective learning.

According to Ganesan. N, (2013, p. 1), in recent times, e-learning has made major developments in becoming one of the fastest growing modes of instructions. Initially, e-learning implementations were mostly centered on hosting course material and course related documents on the websites. Such materials generally include course notes, syllabus, quizzes, PowerPoint slides, references, etc. Only course materials, we can download and study in out of the classroom environment. But other major activities like examinations, in-class lectures and quizzes are conducted only in a classroom environment. Today, technology has helped to adopt all these activities done in an in-class environment to incorporate into e-learning system.

1.1. Cloud computing

Cloud computing, defined by NIST (National institute of standards and technology) is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or cloud provider interaction. The cloud provides on demand self-service - ready to use services with minimal intervention from the provider.

Cloud computing is Internet-based computing, where information, shared resources and software are provided with computers and other devices on the requirement. One can easily use applications without purchasing, installing software on their personal computers or servers. The advanced processors have all potential to make cloud computing a compelling paradigm. Some of these advancements are disk storage, virtualization technology, broadband internet access and fast, inexpensive servers. According to (Zrakic et al., 2013, p 302) one of the major characteristics of cloud computing is scalable and that made it possible by the technology of virtualization. Virtualization is one of the fundamentals for realization of cloud computing. Virtualization allows efficient usage of resources, because several virtual machines can operate on one single physical machine.

Fernandez, A et al (2012) said that there are three different levels of services provided by cloud computing they are Infrastructure as a service (IaaS), Platform as a service (PaaS) and software as a service (SaaS).

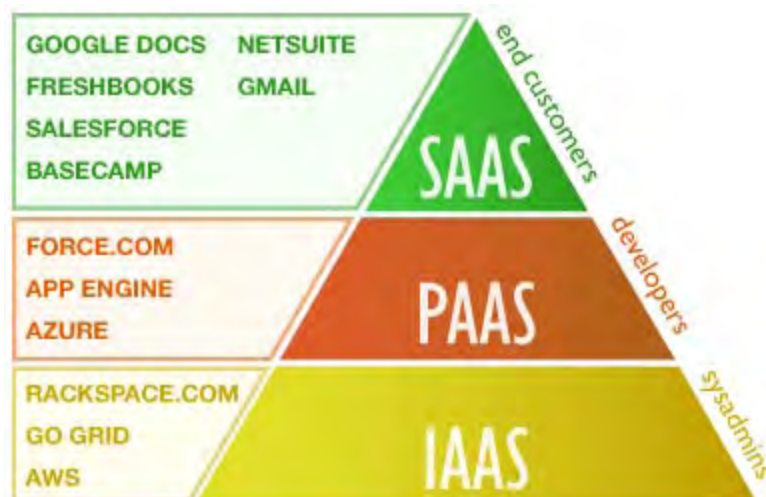


Figure: 1- Illustration of layers of services oriented architecture - Fernandez, A et al (2012)

Infrastructure as a service (IaaS) is the providing of hardware as a service to the users, hardware as a service refers to providing servers, storage, and computation, basic characteristics of operating system and virtualization of hardware resources. Some of these service providers are Rack space, Go grid, AWS.

Platform as a service (PaaS) provides more than infrastructure, which means to provide an integrated set of software which is used by developers to build applications. PaaS provides services for both development and execution stages of the project. PaaS providers examples are Azure, App engine and Force.com.

Software as a service (SaaS) provides software as a service which was one of the first implementations of cloud providers. It has its origin in the host operations carried out, but the application provider's service. Some of the SaaS providers are Google docs, Sales force, Base camp and Gmail.

1.2. E-learning using cloud computing:

Cloud computing is a technology that can bring new values to an e-learning system, because educational services should be delivered in a reliable and efficient manner. Cloud computing also provides a suitable environment for global learning activities. Finally, efforts to introduce cloud computing in e-learning environment have been initiated over the last couple of years and on-going across the globe. Cloud computing technologies can run applications as services over the internet on a flexible infrastructure Afshari, M. (2014). Cloud computing provides a low cost solution to the academic institutions for their researchers, students and teachers. According to Afshari, M. (2014) the contribution of cloud computing to e-learning systems offer many benefits to the organization. They are:

- The cloud provides quality of service (QoS) - guaranteed infrastructure such as cost, time, reliability and hardware performance like memory size and CPU bandwidth and sustains SLA oriented resource allocation.
- The cloud provides resource utilization information and real time configuration, improves the usage rate of resources and allocates resources on demand.

- The cloud provides support to many applications, building it convenient and rapid to get the required computation and storage resources.
- Through the automatic resource allocation management, labor intensive jobs can be achieved and emergencies can be solved rapidly. Hence the cost is reduced.

According to (Zrakic et al., 2013, p 305) the development of typical e-learning systems using cloud computing involve a different integration process.

- A human resources integration, which is students, teachers and other participants involved in the process can access the system and can communicate from any other location.
- Process integration, which refers to the adaptive integration process are integrated to the web services.
- Information integration, which is the system enables gathering heterogeneous, unstructured data, while users can access structured data
- Application integration means the integration is realized at the application level of cloud computing infrastructure.

The method of integration of e-learning services to CC infrastructure is shown in below mentioned figure. 2



Figure: 2 - Integration of e-learning service with cloud computing- (Zrakic et al., 2013, p 305)

Considering the existing IT infrastructure in educational organizations, cloud computing paradigm can be applied with different kind of approaches. A significant issue is to choose the appropriate deployment model for the educational institution. Depending on the type of ownership of physical resources and infrastructure of an organization, the following deployment models of cloud computing can be developed [Pund, B et al, 2012]: a public cloud, a private cloud, a hybrid cloud and a community cloud.

- Public cloud constitute the first expression of cloud computing. They are a realization of the canonical view of cloud computing in which the services offered are made available to anyone, from anywhere and at any time through the internet. From the structural point of view they are a distributed system, most likely composed of one or more data centers connected together, on top of its specific services offered by cloud are implemented. A number of universities providing cloud based e-learning through various cloud providers such as Amazon, Google, and Microsoft etc.
- Private clouds are provided by an organization or their designated services and offer a single tenant operating environment with all the benefits and functionality of elasticity and accountability or utility model of the cloud environment. The important aim of private clouds is to address concerns on data security and offer greater control for vendors, which is lacking in public clouds. Recently, the number of private Cloud based solutions within e-learning institutions has been significantly increased.
- A Hybrid Cloud is a cloud service which is an integration of both the public and private clouds and is used to perform distinct functions within the same organization.

Depending on how technology is provided and used, e-learning solutions, implements one or more cloud computing service models such as Infrastructure as a service (IaaS), Platform as a service (PaaS) and Software as a service (SaaS). Infrastructure as a service aims to provide

computing infrastructure, load balancers, firewalls, disk image library or storage as a service to users. In this model users install the operating system on the machines as well as their application software by themselves. Platform as a service model enables programming language execution environment for users. This model allows users to develop and deploy their own software solutions. Software as a service model provides specific software that runs on a cloud infrastructure. The users of these services do not control or manage underlying infrastructure and application platform (Zrakic et al., 2013)

Hugos and Hulitzky (2011, p. 88) states that Cloud deployment offers significant advantages with its low start-up cost and quick delivery of computing resources, as well as its pay as you go cost structure. In addition CC offers ease of management, scalability of systems as needed and location independence so people can access these systems from many different devices such as PCs, virtualized desktop, iPad and smart phone like blackberry or iPhone. Finally, CC enables rapid innovation in organizations to respond to the evolving markets. So, considering all these advantages my primary research objective is to evaluate whether new or existing educational institutions in India can implement or adopt cloud computing services to expand their business rapidly.

According to Masud, A and Huang, X. (2012) there are several advantages in cloud computing, which are the main key reason to implement e-learning using the cloud. Below is the table difference between traditional computing and Cloud Computing.

Traditionale-learning	Cloud e-learning
Buy Assets	Buy service
Build Technical architecture	Architecture included
Pay for assets	Pay for use
Administrative overhead	Reduced Admin function
Internal networks	Over the internet
Corporate desktop	Any device
Single tenant	Multi-tenant, Scalable, Elastic

Static	Dynamic
Costly, Lengthy deployments	Reduced deployments time
Land and expand staffing	Fast Return On Investment

Table -1: Difference between traditional e-learning and cloud based e-learning: Source - Masud, A and Huang, X. (2012).

- In the traditional method of e-learning educational institutions need to buy the assets, but in cloud computing cloud provider will provide the services.
- The fixed payment should be paid in advance for traditional e-learning systems and in cloud we do not want to pay in advance; the payment should be according to the use.
- Technical modelling in traditional e-learning systems is Single tenant and non-shared. Multi-tenant and shared in cloud computing.
- Scalability is the Static and the manual scalability of traditional e-learning systems. In cloud computing scalability is dynamic and elastic.
- In traditional e-learning systems, we can access the data only by desktops. The deployment of this model is costly and lengthy and the remote access is not that much easy, but in cloud computing we can access the data anywhere, any place at any time. The deployment time is very less and accessibility over the internet from any device in the cloud model.

1.3. E-learning in India:

The rapid increase in the internet connectivity in India leads to the increase in the growth of e-learning. A robust internet ecosystem, with multiple local and global providers help learning make further easy through online. The e-learning concept is not only developing in schools, but also more companies adopting the e-learning to improve their employee's knowledge about the company. The number of internet users is expected to reach 250 million, which will lead to improve further adoption of e-learning. India's online market size is set to

increase to \$ 40 billion by 2017 from the current \$20 billion (The Financial Express, 2014). India has one of the largest educational systems in the world with more than a million schools and 18000 higher educational organizations. More than half of the population in India falls under the target market for education and related services. This shows how e-learning has a major role to play in the development of the country's economy.

According to Ray, P (2010), Though India has many schools and institutions with more teachers and facilities for students, the quality of education is lacking. This is due to various factors like social backgrounds of parents, students and not the same standards for teacher training program. These all the factors lead to the adoption of e-learning in India. The approach taken by the Indian government in the adoption of e-learning, they are:

EDUSAT: This action, taken place in the early 1970s to use satellite for education, this process has become more successful in transforming to high-tech education.

Netvarsity: This approach started by National Institute of Information technology and (NIIT) in 1996 which is the first online educational enterprise started.

Teaching shoppe: After NIIT started netvarsity in the 90s; some private institutions started teaching shopper an online initiative of training students for engineering and medical entrance exams.

NTFITSD: National Task force on Information Technology and Software development started by some private institutions which plan to develop e-learning further.

VCI: Virtual campus initiatives are taken by Indira Gandhi National Open University (IGNOU) in 1999, to deliver distance learning in India.

After IGNOU adopted e-learning in 1999, there are more universities adopted e-learning. The major universities are IIT, Amrita vishwavidhyapeetham, BITS Pilani, Jadavpur University, Aligarh Muslim University, Central Institute of English and foreign language and many other schools and universities adopted later on.

India is a major role to play in international e-learning services industry and it is already a major service provider of IT resources. India is now aiming to achieve same in other IT

enabled industries Aggarwal, D (2009). The presence of world class educational infrastructure and training professionals will help to achieve the same in future.

1.4: Cloud e-learning providers in India:

Eduvative technology is an educational technology company which works for the betterment of education with the power of technology (Eduvative. in, 2015). Their mission is to embed technology in education for its improvement by the genius touch of their solutions, through simple principles of 3A. 3A's refer to affordability, availability and adaptability. Educative technology's vision is to be recognized for its technology based products and solutions, making it reach and improve the root level of education in several years down the line.

White house business solutions Pvt. Ltd provides e-learning services, which is started in 1999 and located in Chennai, India. WHBS has its own infrastructure to deliver their services and they have reputed client list like educational technology division Singapore, Curriculum development central Malaysia, Education Scotland, Great Britain, Asia e-university Malaysia, Westchester Institute for Human Development New York, USA will be their great strength. They are delivering e-learning services for various sectors in various domains. WHBS proposed successful business models to establish their products worldwide. With emerging tools, standards, compliances cropping up day by day due to technological advancements, WHBS offers one stop solution for all the requirements in e-learning industry (Whitehouseit.com, no date).

CSC e-governance services India Ltd company main objectives are providing e-learning infrastructure for the delivery of e-learning services, implementation of research and development framework for e-learning innovation, providing support for development of e-skills and knowledge network and securing cyberspace.

Origin is a leading solutions and services company for corporate, publishers and educational institutions. They provide content development strategies and execution, LMS application services and solutions etc.

BrainSmiths consultants are a software outsourcing company which provides high qualitative and cost effective custom application development to its clients globally. Some of their

focused industries include Education, e-learning media, e-commerce, financial, health care and entertainment etc.

1.5: Research Focus:

Much of the existing research on cloud based e-learning in India is very much academic. This has produced much insight. However the experts (practitioners and e-learning industry experts as per section 1.4) have not had much of a voice. This dissertation addresses this gap, balancing industry experts with their views and views of internal college e-learning experts.

1.6: Research questions:

What do experts in e-learning industry in India considers to be the key influencing factors in deploying cloud based e-learning?

So, considering all the advantages of cloud computing in e-learning industry my first research question is to evaluate the key factors while implementing cloud based e-learning. This question provides answers to educational institutions to analyze the key influencing factors before deploying cloud based e-learning. This question will be asked of the experts in e-learning industry and internal college e-learning experts.

Can cloud based e-learning be successfully implemented by startup education institutions in India?

My second question is to know whether cloud based e-learning can be successfully implemented by startup educational institutions in India. This question provides answers to the start-up educational institutions to analyze the benefits and limitations while choosing a cloud based e-learning systems. This question will be asked of the experts in e-learning industry and internal college e-learning experts.

What do the experts see as benefits of using cloud based e-learning in educational institutions in India?

This question provides the advantages of using cloud based e-learning for both the students and educational institutions. The advantages will be helpful to educational organization to

know what all the benefits are provided by cloud based services to e-learning systems. This question will be asked of the experts in e-learning industry and internal college e-learning experts.

What do experts see as the problems associated with implementing cloud based e-learning in India?

This question is to know the issues faced by educational institutions to adapt cloud based e-learning in India. This question will provide the clear insight of problems associated with cloud based e-learning in India. This question will be asked to the experts in e-learning industry and internal college e-learning experts.

1.7: Research objectives:

There are so many cloud computing services provided to educational institutions worldwide. This study is about finding the key influencing factors while implementing cloud based e-learning systems in educational institutions in India and what are the issues involved while adopting the cloud based e-learning services. This study also evaluates whether cloud based e-learning systems can be successfully implemented by start-up educational institutions in India. This study also focuses on advantages over adopting cloud based e-learning. It involves interviewing, e-learning professionals in different part of India and listening to their views and perspectives related to the study and from previous researches made.

2: Literature review:

2.1: Literature introduction:

The classroom is changing. From when the school bell rings to study sessions that last well into the night, students are demanding more technology services from their schools. It's important not only to keep pace with students evolving needs, but also to prepare students for the demands of the workplace tomorrow.

Cloud computing can provide the solutions to the education institution's needs. Cloud computing brings to education a wide variety of options which are not found in traditional IT models (Cloud computing in education, 2010). Cloud ensures teachers, students, faculty and staff have on-demand access to critical information from anywhere, anytime and anyplace. Both the private and public organizations can use the cloud computing services to deliver better e-learning services, even as they work with fewer resources.

This literature review will cover the framework for implementation of cloud based e-learning systems, advantages of implementing cloud based e-learning system and limitations in cloud based e-learning systems. The emergence of cloud computing will offer a good opportunity for the development of e-learning. Because, educational institutions and organizations need not to be worry about building their own infrastructure for building e-learning systems (Jindia, A. And Chawla, S., 2012). Cloud computing is the method of providing leasing services like servers, storage and other computing resources to the users. Before implementation of cloud based services in e-learning, Educational institutions should understand the framework of cloud based e-learning. Madan et al. (2012) suggested the framework for cloud based e-learning which clearly defines the functions of e-learning cloud. The study conducted by Deepa, N. And Sathiyaseelan, R., (2012) describes the e-learning cloud architecture which will help to implement the cloud based services in educational institutions. This architecture describes about different layers of cloud based e-learning.

The study by Deepa, N. And Sathiyaseelan, R., (2012) will describe the advantages for educational institutions which are using cloud e-learning systems. This study mentions about the advantages for students as well as the management. The most obvious benefit about cloud computing are around cost Rhoton, J. (2011, p.no 97). Sosinsky, B., (2011, p. 35) explains

about the reduction in expenses for institutions choosing cloud based services. The advantages for start-up educational institutions was mentioned by the (Sommer, T. And Subramanian, R, 2013).

The main issue while adopting cloud based services is secured, the user need to choose the trustworthy provider (Rhoton, J., 2011, p.no: 102). The authors Masud, A., Huang, X. And Islam, R, (2014) said that there are more privacy and security risk in e-learning system and cloud based e-learning system. The above study explains the issues in adopting cloud based e-learning system which is discussed in detail.

2.2: Framework for implementing cloud based e-learning in India:

E-learning is the common method of education today. With the emergence of cloud computing, there is a great opportunity for the growth of E-learning. Educational and academic institutions don't have to invest in capital and human and material resources to construct the E-learning environment. All these concerns will be taken care by E-learners cloud providers as they can customize it easily and make it convenient for everyone (Jindia, A. And Chawla, S., 2012). It includes distribution of data storage, centralization of data management and virtualization of data services. One of the major benefits of E-learning cloud is that it offers a data center which has a huge data storage capacity with high speed computation capability. The basic idea is to provide services to students and teachers in the form on rental basis. Cloud computing also reduces the numbers of servers required because of the virtualization of data services.

Moving to the benefits of cloud computing, teachers and administrators can enter their requests for IT resources and they can know immediately whether these resources are available or not. They can submit the request which automatically gets routed to the cloud administrator for approval. They also ensure that all the requests should be fulfilled quickly. Planning and management of use of resources are important activities of the cloud. Planning is essential as it helps to determine the needed capacity, which is required to create new solutions and to meet application performance goals. Computing resources are virtualized and they can be provided in the form of services for educational institutions, students and business to rent computing resources Masud, A and Huang, X.(2012).

“The Cloud service for education includes cloud services and offerings which are designed to help educational system leverage predictive analytics to get real time insights on student performance and institutional performances, enhance researcher effectiveness and improve lab resources for learning “(Deepa, N. And Sathiyaseelan, R., 2012). E-study, study service is a valuable record of students’ academic life. The valuable record includes assignments, evaluations and assessments. These services are critical for managing students’ academic progress and e-study service will be collectively reviewed by management of institutions to manage the performance and progress of education system. The E - study service provides many advantages over paper based alternatives. One reason is accessibility because users can access the services at anytime, anywhere and any device.

According to (Madan et al., 2012) cloud computing is the calculation of providing leasing services to the customers or users, the customers can able access powerful computing capabilities like database storage, server utilization and user tracking with the help of simple terminal provided. To meet the customer needs, which the background cloud concerns care is the number of machines required to achieve the operation successfully. The cloud computing platform consists of large distributed systems, rather than a single machine which user interface displayed. Cloud computing process turns the hardware resources into the virtual resources with virtual machine monitor and can able to manage hardware resources with the virtual resources. According to Deepa, N. And Sathiyaseelan, R., (2012) the biggest challenge in cloud computing may be, there is no standard or single architectural method. Cloud architecture is divided into two sections they are front end and back end. Both front end and back end are connected to each other through a network, usually the internet. The back end is the cloud section of the system and front end is the side of clients or computer user. The front end has a client computer or computer network and the application which is needed to access the cloud system. The back end consists of various computers, data storage systems and servers that create cloud computing services. A cloud computing system can have any computer program for data processing to video games.

Masud, A and Huang, X. (2012) state that e-learning cloud is a migration of cloud computing technology in the field of e-learning, which includes all necessary hardware and software computing resources engaging in e-learning. Computing resources are virtualized and they can be provided in the form of services for educational institutions, students and business to

rent computing resources. The promise of cloud computing is that virtualization will reduce the number of servers required (Madan et al., 2012). In cloud computing platform, teachers and administrators will enter their request for IT resources such as server, storage and software and they can know immediately whether these resources are available. If available they will submit their request and will route to the cloud administrator for approval. This is an automated process so the requested resources will be available in a short period of time. Resource usage planning and management are important process of deploying cloud services. Virtualizing servers is a growing trend in IT world which is the software can be installed allowing multiple instance of virtual servers to be used. In this manner, we can have multiple virtual servers running on a single virtual machine.

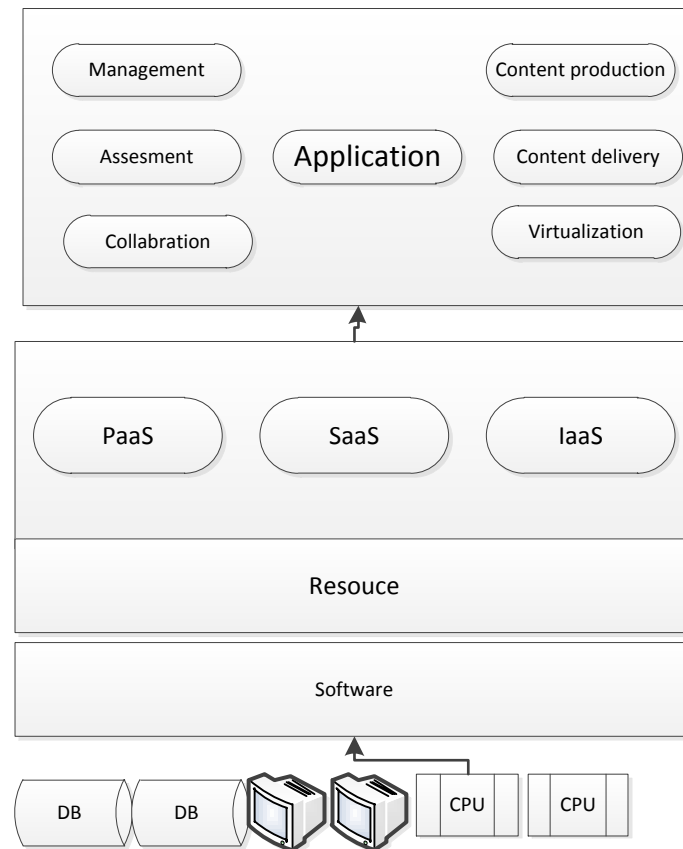
The cloud computing platform offers resources to teachers and students in the form of rental basis which is based on consumption. In cloud based e-learning model data storage is highly distributed, data management is highly centralized and data service is highly virtualized, which ensures safer data service. Generally, each application will have its own servers deliver the service. A central server which acts as a system administrator will monitor client demands and network traffic. This central server ensures that everything is running smoothly according to the client requirements. Central server follows set of rules called protocols and uses the special kind of software known as middleware. Middleware permits networked computers to interconnect or communicate with each other. Most of the time, servers do not run with full capacity, which states that processing power going to waste in some cases. By maximizing the output of each individual server, virtualising server will reduce the need for more physical machines (Deepa, N. And Sathiyaseelan, R., 2012)

According to Masud, A and Huang, X. (2012) The e-learning architecture can be divided into following layers: Infrastructure layer, software, resource layer, resource management layer, service layer and application layer. Infrastructure layer as dynamic layer, Software resource layer that provides a unified interface for e-learning developers, The loose coupling of software and hardware resources is achieved by resource management layer, Service layer contains cloud services such as SaaS, Peas and IaaS and the application layer focus on content delivery, content production, virtual lab and assessment features etc.

(Madan et al., 2012) mentioned frame work for cloud based e-learning which has parted into three layers such as the base layer of e-learning in the cloud, a Platform layer of e-learning in cloud and application layer of e-learning in the cloud.

- The base layer of e-learning in cloud provides IT infrastructure resources and connects the huge system pool to share the services. Cloud computing lets the hardware layer run more like the internet, to make the hardware resource accessed and shared as data resources secured and scalable manner. Virtualization technology splits the hardware from the operating system, which makes storage and computing capacity of the existing server into the smaller size and reintegration to improve the flexibility and utilization of Information Technology resources. Then base layer can also provide a common interface for large scale cloud computing integration that enables the publication of calculation. The platform layer can also make use of basic hardware resources provided by the base layer and also the users can make use of the base layer.
- The platform layer of e-learning cloud carries the task of software development, data storage and computing with the help of the powerful hardware resource provided by the base layer. Platform layer can achieve the task of completion of mass data storage, business intelligence processing and many things which are difficult to complete. Users can choose the number of devices according to the complexity of dealing with the content. Virtualization technology allows the platform to show a strong level of flexibility.
- An application layer of e-learning cloud: Application software or services provided by a university or school, the students or the other users pay in the similar way on demand access, according to the amount to calculate the cost and complete the production, trading and marketing. E-Learning cloud environment provides user oriented adaptive hardware resources, software services and computing environment. In e-learning cloud space users can access the digital services from anywhere, anytime and anyplace.

From the above information, the architecture is derived from implementation of cloud based e-learning in educational institutions. This architecture consists of five layers which clearly explain the functions of cloud based e-learning. Below is the architecture of cloud based e-learning.



(Figure 3: E-learning Cloud architecture, Source: An e-learning system architecture based on cloud computing, Masud, A and Huang, X., 2012)

Infrastructure layer consists of information infrastructure and teaching resources. Information infrastructure consists of internet/intranet, information management system, system software and some common software and hardware. Teaching resources are gathered mainly in traditional teaching model and distributed in different departments and domains. This layer is the least level of cloud service middleware. The basic computing resources like CPU, physical memory is delivered by this Infrastructure layer. Through the use of virtualization technology, storage, physical server and network forms virtualization group for being called by upper software platform. Virtualization allows multiple operating systems with different virtual machine independently on the same physical machine running in parallel (Madan et al., 2012). Virtualization technology in cloud computing helps to reduce the needs of physical servers, so educational institutions will be benefited by reducing their expenses.

Software resource layer mainly comprised of operating system and middleware. Through middleware technology, numerous software technologies are integrated to provide a united

interface for software developers in an organization. Hence, the software developers can easily develop many applications based on software resources and deploy in the cloud for the CC users Masud, A and Huang, X. (2012).

Resource management is the main layer to achieve the loose coupling of software resources and hardware resources. The integration of cloud computing strategy and virtualization helps in achieving the uninterrupted on demand distribution of software resources over various hardware resources (Deepa, N. And Sathiyaseelan, R., 2012).

Service layers consist of three levels of services, namely, Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS). These service layers help cloud computing users to use various types of cloud resources for their products like hardware resource, software resource and infrastructure resource (Pund, B., Nair, S. And Deshmukh, P, 2012).

Application layer: This layer comprised of content delivery technology, content production, educational management component, educational objectives and assessment criteria. The application layer is responsible for the integration of teaching resources in cloud computing model (Masud, A and Huang, X., 2012).

The educational institution which chooses above architecture for e-learning will have various advantages such as powerful computing and storage capacity, High security, Virtualization, High availability and the main advantage is that it provides rural students in institutions to access costly software running on a high performance processor (Masud, A and Huang, X., 2012). After using cloud based e-learning model educational institutions will not be worried about their IT department and they can concentrate on their business development process to grow globally.

So, educational institutions should select a proper architecture before implementing cloud based e-learning, the above architecture will help them to develop a successful cloud based e-learning systems.

2.3: Advantages of implementing cloud based e-learning in India:

Cloud computing can provide the solutions to the education institution's needs. Cloud computing brings to education a wide variety of options which are not found in traditional IT models (Cloud computing in education, 2010). Cloud ensures students, Teachers, faculty and staff have on-demand access to critical information from anywhere, anytime and anyplace. Both the private and public organizations can use the cloud computing services to deliver better e-learning services, even as they work with fewer resources.

According to Zimara, S (2013) there are five main characteristics of cloud computing, which offers to businesses, they are:

On-demand Capabilities.

An organization or cloud computing user can quickly and easily configure the computing resources when they need and without contacting the cloud providers. An important point is that what they are using is service-based not resource-based. Educational institutions can add or delete users and change storage networks and software as they needed. This will allow the users to be in control of their business and they can make better decisions for their current and future needs. The cloud users will be billed by pay as you go method or monthly subscription method to pay for what computing resources they are using.

A broad network access:

In educational institutions any staff or student can access the e-learning system using their smartphones, tablets, laptops and office computers. They can use these devices to access their applications through internet wherever they are on campus or in the road.

Resource pooling.

The cloud computing allows educational, institutional users enter and use the data within the business management software hosted in the cloud at the same time, from any location, and at any time. The CC provider's computing resources are pooled to serve all users using their services.

Rapid elasticity:

An educational institution can quickly and easily add or remove users, software features, and other computing resources. Institutions can rapidly scale up or scale down the computing resources, so they can manage the costs depends on their business needs.

Measured service:

Going back to the affordable nature of the cloud, the organization only pays for what they use. The cloud provider will charge using a metered method, which means users' usage will be measured by the cloud provider. User can also access the measurement to check how much computing resources they used, which will increase the transparency.

Deepa, N. And Sathiyaseelan, R., (2012) said that cloud computing is basically a method of running educational institutions without undertaking all hard work. The reasons behind more educational institutions shifting to the cloud are:

- Cloud software is easy to use
- Benefit for student and teachers.
- To get started fast
- Minimal investment of the computing resources
- Scalability
- Extending the curriculum to anywhere and anytime
- Lower maintenance cost
- Cheaper data storage cost
- Security and reliability
- Collaboration tools

Cloud software is easy to use by the users in educations institutions users such as teachers, students and others, because the service provider ensures that their software can be used with little training. So the users do not waste time on learning software, documents and how to use it.

Fast to get started: the time to implement cloud computing can be in days and in some cases it will take only hours. Users do not need to buy hardware or installing the operating system, they simply sign up and access the resource needed. Educational institution cloud based

application can be set-up in a few days. For accessing these accounts, customers need to sign up their accounts and work with that application in a matter of minutes (Pund, B., Nair, S. And Deshmukh, P, 2012).

Cloud based E-learning enables students to take online courses, attend the online exams, get feedback about the courses from instructors, and send their projects and assignments online to their teachers. It is also advantageous to teachers as they can prepare online tests for students and they can create better content resources through content management systems, homework, assess the tests, projects taken by students, communicate with students through online forums and send the feedback (Hashemi, S. And Khalil, M).

Minimal investment of the computing resources: Cloud computing is typically less expensive than solutions deployed in traditional data centers when considering the cost of the software, hardware and human resources that have to maintain the system. The users don't have to use high and configured computers to run the applications because they now can run the applications from their mobiles, tablets and personal computers which have a minimum configuration with internet connectivity through cloud. The user has no need to spend money for large memory on local machines, because the data is created and accessed in the cloud. It's cheaper as organizations also need to pay as per their usage and need to pay only for the space they need. So educational institutions can mainly reduce the time and money it spends on hardware and software (Deepa, N. And Sathiyaseelan, R., 2012).

Extending the curriculum to anywhere and anytime: Academic files and documents are deployed on the internet. So, students and teachers can access those files any time of day or night. This gives advantages to students because they can plan to study at home or in schools. Cloud based E learning has the objective to provide easy access to costly software running on high performance processors to rural students studying at the institutions which do not have the proper facilities.

Scalability: Which is related to cost because educational institutions can add users and other computing resource capacity if needed. Also educational institutions can reduce their resource capacity easily.

Lower maintenance cost: As the software is owned by cloud service provider, the user does not have to worry about spending time on updating the servers. They can move forward in the

business development process. This keeps maintenance cost down in the organization and users know they are always working on the updated software (Hashemi, S. and Khalil,M).

Cheaper data storage: Data storage is more expensive for any organization. Cloud computing provides educational organizations with less data storage expenses, because the data is stored on their own servers. Since the main part of the applications and data is stored in the cloud, losing a cloud client is no longer a major incident. A new client can be connected very fast at any moment (Deepa, N. and Sathiyaseelan, R., 2012).

Security and reliability: A very big concerns for educational institutions is secure because the academic data are owned by the third party service providers (Pund, B., Nair, S. and Deshmukh, P, 2012). So cloud computing service providers major security benefits to the cloud users

- Data should be kept privately because anyone can access the system
- Files and documents will be back up regularly or daily
- Education institution must access all the data if needed to shift the provider's service
- The security level needs to be greater than in normal cases.
- Cryptographic methods are used to ensure only authenticated user accessed the system.

Collaboration tools: Cloud also ensures the interaction between the institution uses to develop and extend the learning system. The online communication system will encourage the students to communicate with teachers to solve any issues and get in touch quickly rather than in class doubts. Chat is available to connect between them anytime quickly. Video chats allows to share the information and interactive whiteboard and new tools are provided by the cloud providers, which support problem solving.

The most obvious benefit about cloud computing are around cost Rhoton, J. (2011, p.no 97). According to Willcocks et al. (2014. P. 25) One claim frequently made about cloud computing is that it enables cost reduction. The Author Willcocks et al. (2014. P.25) said that the top rated business objective for the clients, analysts and suppliers was cost efficiency followed by rapid deployment, scalability and ensuring high security. Network connectivity improvements in the present era allow cloud computing companies to locate their data centers where the power and cooling are cheaper. Due to their huge size economies of scale in

operation and staff, software and hardware, electricity, and leading to a reduction in cost these resources. So, with these costs, reduced resources, major cloud computing companies are providing their computing resources for cheaper price.

“The major part of cloud computing’s value and its appeal is its ability to convert capital expenses (CapEx) to operational expenses (OpEx) through a usage pricing scheme that is elastic and can be right sized” Sosinsky, B., (2011, p. 35). The transition of real assets to the virtual ones gives a measure of protection against too little infrastructure. Basically, moving expenses from CapEx to OpEx side of a budget allows companies to transfer their risk to their cloud provider. Capitalization is the main reason that many small businesses fail and for small businesses growth is difficult, when revenues does not cover the expansion. Cloud computing is the worthy option when the cost of infrastructure and management is huge. Cloud computing allows the organization to right size their infrastructure.

According to (Sommer, T. and Subramanian, R, 2013) Start-up educational institutions can implement cloud computing based e-learning service, because of the following advantages:

- The emergence of new cloud service providers became high in the last couple of years, providing more variety of innovative and competitive cloud computing services.
- Many new technologies have emerged over the recent years, which enhance cloud computing service.
- Small organizations can have remarkable economic advantages and save their time by migrating their e-learning system to cloud by choosing an exact cloud service provider.
- Cloud based e-learning will require limited in house infrastructure which will reduce the administration functions for startup educational institutions and they can use resources for other activities.
- The process of migrating to cloud based solutions will take shorter time when compared to building the traditional web based e-learning system.
- Storage services, on-demand processing and the host environment for developing applications will attract smaller institutions and startups because of no capital investment required.

- Cloud based e-learning solutions also help the startups compete globally and grow their business within shorter period of time.

Cloud computing services are really helpful to start up institutions, because there is no need to worry about the initial capital expenses. So they can use cloud based e-learning services and pay for what they are using.

2.4: Limitations in cloud based e-learning:

Cloud computing is a developing technology that uses cloud power to provide many technical solutions. The e-learning system is also one of these technologies using cloud power to enhance the performance of both e-learners and management. Cloud based e-learning has numerous advantages over the traditional e-learning systems. But, security is the major concern in cloud based e-learning (Masud, A., Huang, X. and Islam, R., 2014).

A common problem for the adoption of cloud computing is security because service provider hosts the sensitive data. The user must consider the trust worthy cloud service provider which will secure the data Rhoton, J. (2011, pp. 102).

According to Rhoton, J. (2011, pp. 233) the international Information systems security certification consortium (ISC) has defined ten security domains, which are very useful to analyze the security when implementing cloud services.

Access control: Access control will provide a mechanism to protect unauthorized access and modification while giving access to authorized users. This domain intersects with cloud computing at multiple levels of access. Physical datacenter access may be based on advanced authentication mechanism like smart cards and biometrics. Logical access to resources given by cloud providers should also be strictly controlled. Then end user access is a big security problem for an organization, a mechanism needed for identity management to avoid this.

Application Security: Application security covers the software development life cycle and multiple security levels for in house actions.

Business continuity and Disaster recovery planning: This includes planning for the natural disasters and catastrophic system failures. It also includes planning for comprehensive backup and recovery solutions. This task is complicated when an organization is having multiple providers, so it is good to consider business continuity and disaster recovery planning before implementing CC.

Cryptography: It is a heart of a large portion of data security techniques at present era. Cryptography will be a good answer to many security concerns in cloud computing. In order to use or manipulate the data, it is necessary to have the encryption keys (Rhoton, J., 2011, pp. 234).

Information security and risk management: This discusses the policies, procedures, standards and guidelines for risk management. When an organization implements cloud computing service, its risk is also transferred to the cloud providers and on the other hand organizations itself losing control of critical activities. So, Information and risk management must be discussed before cloud implementation.

Legal, Regulatory, Compliance and Investigations: This covers the regulations and laws in information security, which is also more important to analyze while implementing Cloud service. Due to multi-jurisdictional nature of cloud computing and decoupling of data owner and data controller, legal questions become more complex.

Operation security: This includes guidelines for backups and change control management. This operational security process creates more problems in multi-provider environment.

Physical security: Environmental or physical security is essential for the data center and for any network links from outside the corporate boundary. This domain, mainly concentrates on site location principles and physical security mechanism.

Security architecture design: This process concentrates on security policies covering from data center backups to user desktops and planning for antivirus as well.

Telecommunication and network security: This provides communication security, because cloud computing involves more networked communications. This analysis is must for any organization.

According to Masud, A., Huang, X. and Islam, R, (2014) there are more privacy and security risk in e-learning system, they are:

User authorization and authentication: The main feature of an e - learning system is reliable identification. So, identity management and security for authorized user is must to avoid unauthorized users. Access to the e-learning materials should be given only to the registered students.

Entry points: There are various entry points in e-learning systems, developers need to reduce the entry points to increase the level of security risks. E-learning systems can be accessed by users through internet from all around the world.

Dynamic nature: The dynamic nature of e-learning system is that any member can join or leave the group at any time. So, security must be tightened to ensure each person accessing is an authorized user. Strict principles need to be maintained and credentials must be verified to control at session level.

Protection against manipulation: One of the issues in e-learning systems is that students can operate or manage the system. So, Security level must be raised using techniques of encryption, firewall and digital signatures.

Confidentiality: Confidentiality in e-learning refers to securing information and data from unauthorized users or devices. The institution and students need to be assured that their data and assignments are secure.

Integrity: Integrity is that only authorized users need to add, modify or delete the information in the e-learning system. The attacks on integrity are to delete or modify data without proper authorization.

Availability: The e-learning data is to be available to the students or users whenever they are accessing the system. Mainly there are two attacks needed to be considered at this portion, they are blocking attacks and flooding attack such as denial of service, node attack and line attacks (Hashemi, S. and Khalil, M).

Author Masud, A., Huang, X. and Islam, R, (2014) said that when shifting e-learning to the cloud, the major concerns are about confidentiality, availability and integrity. As security remains the major issues in cloud based e-learning, there are many threats that need to be focused before implementing cloud based e-learning systems.

Misuse of cloud: Misuse of cloud includes decoding, creating spam, cracking of passwords and executing malicious code to access the important information in e-learning systems such as learning materials, question papers and assessment during classes.

Software access: Number of APIs and software interfaces are used by users in e-learning systems to access and manage cloud services. These APIs plays an important role while monitoring, managing and provisioning the process running in CC environment. So, These APIs needs to be secured using authentication, encryption and other methods.

Malicious Insider: Malicious employees who are working with cloud providers and at user side can perform insider attacks. These attacks generally made to take the information like user credentials and vital information.

Data loss: Operational failures, inconsistent use of encryption keys and unreliable data storage will lead to the loss of valuable data in the organization. Operational failures generally refers to deleting the records without any backup of the files and inconsistent use of encryption keys will allow unauthorized users to access the data.

Incorporated risk: E-learning users must be aware of how their data is stored by the providers. It is important to know the software code updates, software versions, security practices and intrusion attempts. These are the incorporated risk associated with the cloud based e-learning systems.

Hackers: Hackers are a real problem for data deployed in the cloud. Hackers can sell the organization's data and information to their competitor and they can encrypt the storage until the user pays them. Hackers can erase everything to damage organization business.

2.5: Literature conclusion:

E-learning is generally inclusion of many forms of educational technology in teaching and learning. E-learning includes many types of media that delivers video, audio, text, computer based learning and web based learning. E-learning systems require many hardware and software resources, Educational institutions generally cannot afford the huge investment in these resources. Many educational institutions are still using the traditional way of teaching because of this problem, so cloud computing is the only solution for these institutions [Hashemi, S. and Khalil, M]. Madan et al. (2012) describes an architecture which will help the educational institutions to implement cloud based e-learning in India. The educational institutions which are choosing the architecture for e-learning systems will have various advantages like powerful computing and storage capacity.

Deepa, N. and Sathiyaseelan, R., (2012) mentions that cloud based e-learning systems will reduce the hard work of any educational institutions, because of its numerous advantages. The main advantage of cloud computing is converting capital expenses to operational expenses which will reduce burden for start-up educational institutions Sosinsky, B., (2011). A common problem for the adoption of cloud computing is security because service provider hosts the sensitive data. The user must consider the trust worthy cloud service provider which will secure the data (Rhoton, J., 2011). The security is the well-known limitation of cloud computing which will be avoided when the user choose trustworthy cloud service provider.

Authors Pund, B., Nair, S. and Deshmukh, P. (2012) said that cloud based e-learning will help the development of education offered to the learners and increase the quality of education. Cloud based e-learning system will help teachers, student, staff and trainers to very high extent and mainly students from the rural areas will get an opportunity to share the knowledge.

These certainly are the scope of potential for cloud based e-learning in India. Much of the academic literature shows this. These are academic researchers mainly and they are not working in the e-learning field or researching and developing e-learning products. However, the voice of practioner experts who work in e-learning industry and colleges has not been researched. This is the focus of this dissertation.

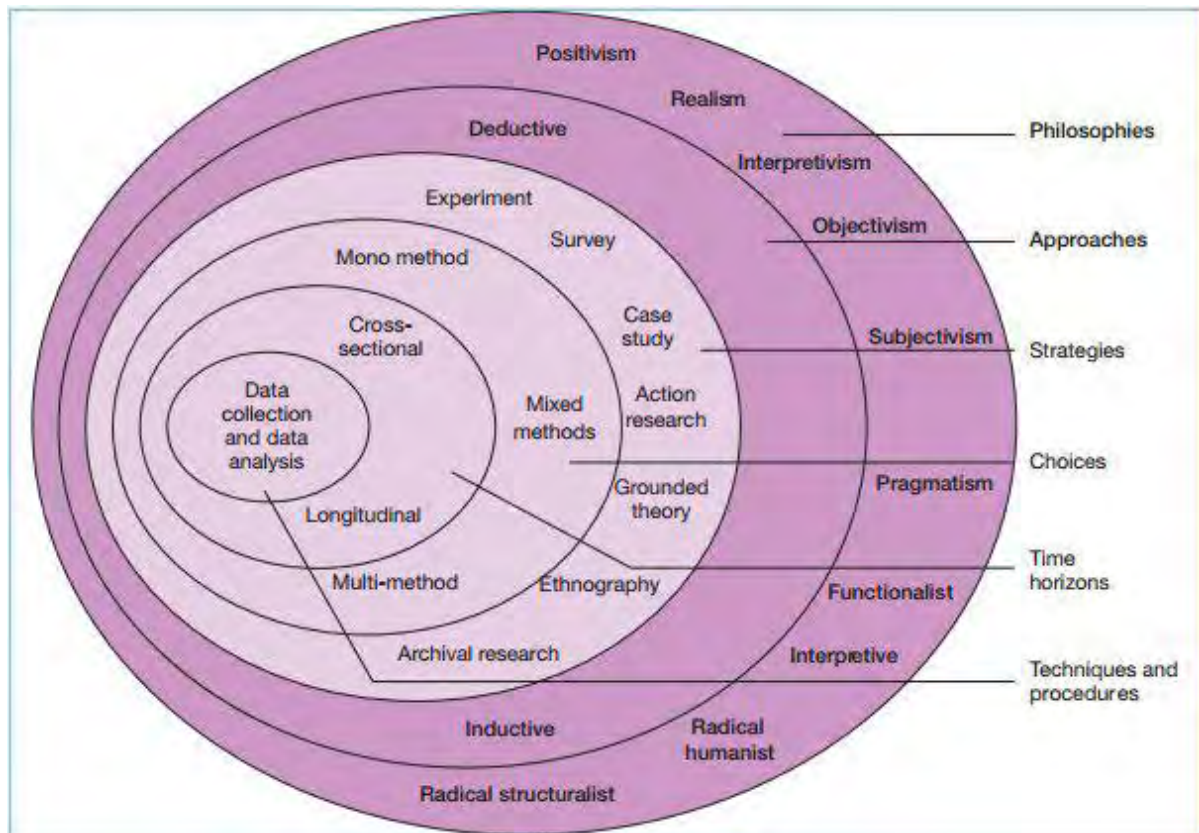
Chapter 3: Methodology:

3.1: Methodology Introduction:

This study is conducted to analyze the key factors influencing while implementing cloud based services for educational institutions in India. The research methodology used here is qualitative methodology. Authors Saunders, Lewis and Thornhill (2012, pp. 159) said that qualitative methodology is often used as a synonym for any data collection method such as interview or data analysis procedure such as categorizing data that generates or uses non numerical data. Qualitative research studies the participant's meanings and relationship between them, using a variety of data collection techniques and analytical procedures, to develop a conceptual framework. Data collection is non-standardized so that procedures and questions may emerge during the research process that is both naturalistic and interactive Saunders, Lewis and Thornhill (2012, pp. 163). The success of the researcher's role is dependent not only on gaining the physical access with the respondents, but also building good relationships and demonstrating sensitivity to gain cognitive access to their data.

As a rule, qualitative examination has generally been led by the method of direct perception of an example, research actions, particular encounters, an observation, an examination of important writings, biographies, meetings, center gatherings, and the analyst, investment in the settings that he/she is inquiring about (Hogan, Dolan and Donnelly, 2011, p. 7). The qualitative methodology to research contrasts from the quantitative approach in various critical regards (Hogan, Dolan and Donnelly, 2011, p. 7). The research will be conducted from the secondary data available, case studies and scientific literature related to the topic; and the primary data will include the results from the formal interviews of professionals working in e-learning provider companies and e-learning professionals in educational institutions. Conclusions will be derived based on the study of the formerly conducted research and structured interviews conducted.

3.2: Research Design



(Figure 4: The Research Onion, Source: Research Methods for Business Students, p. 102)

According to authors Saunders, Lewis and Thornhill (2012, pp. 159), research design is the general plan of how the researcher will go about answering their research question. Research design will contain clear objectives derived from the research question, specify the sources from which researcher aims to collect the data and discuss ethical issues and constraints researcher will inevitably encounter.

3.3: Research Philosophy:

Research philosophy relates to the development of knowledge and the nature of knowledge (Saunders, Lewis and Thornhill, 2012, pp. 127). At every stage in our research, we make

assumptions, assumptions about human knowledge and the nature of realities encounter in your research inevitably shape how researcher understand their research questions, the methods they use and how researcher interpret their findings. The research philosophy researcher adopt can be thought of as their assumptions about the way in which they view the world (Saunders, Lewis and Thornhill, 2012, pp. 128).

According to the model mentioned above, each and every layer is essential for different process. The research philosophy of this research is based on **interpretivism**. Interpretivism advocates that it is essential for researchers to understand the differences between humans in our role as social actors. This highlights the difference between conducting research among people rather than about objects such as trucks and computers (Saunders, Lewis and Thornhill, 2012, pp. 137). According to authors Saunders, Lewis and Thornhill (2012) interpretivism comes from two intellectual traditions, they are phenomenology and symbolic interactionism. Phenomenology refers to the way in which as humans make sense of the world around us and symbolic interactionism, we are in a continual process of interpreting the social world around us in that we interpret the action of others with whom we interact and this interpretation leads to adjustments of our own meanings and actions.

Crucial to interpretivist philosophy is that the researcher has to adopt an empathetic stance (Saunders, Lewis and Thornhill, 2012, pp. 137). The challenge here is to enter the social world of our research subjects and understand their world from their point of view. So, I am keen to analyze-learning expert's point of view on the key factors influencing, advantages and problems associated while implementing cloud based e-learning system.

E-learning is a developing technology in India, so I am very much interested to discover the advantages and challenges while implementing cloud based e-learning. Doing the dissertation on the developing technology will definitely enrich my master's degree. Being a cloud computing student, I am very much interested to know more about cloud based e-learning services and its impact on educational institutions.

3.4: Research Approach:

This study follows an **inductive approach**. In Inductive reasoning, there is a gap in the logic argument between the conclusion and the premises observed, the conclusions being judged to be supported by the observations made (Saunders, Lewis and Thornhill, 2012, pp. 143).

Author explains that deduction has its origin in research in the natural sciences; the emergence of the social sciences in the 20th century led the researchers to be wary of deduction. The researchers were critical of deriving an approach that enabled a cause effect link to be made between particular variables without an understanding of the way in which humans interpreted their social world. This is the strength of the inductive approach (Saunders, Lewis and Thornhill, 2012, pp. 146).

According to authors Saunders, Lewis and Thornhill (2012), The inductive approach is projected to allow meanings to emerge from the data as researcher collect them in order to identify the patterns and relationships to build a theory, but it does not prevent researchers from using existing theory to formulate their research question and even to identify concepts that researcher wish to explore in their research process. So, I am collecting the data from the formal interviews with the e-learning experts and analyzing with the help of the literature review to derive at the conclusion.

This is a new concept because cloud based e-learning is a developing technology which is used by few universities and other organizations. So, this research will be an inductive approach. The aim would be to know what is going on in cloud based e-learning process, in order to see healthier the way on the issue. The research then would be to recognize the meeting information gathered by investigating this information. The thoughts are elaborated and refined and finally relate these ideas and philosophies to the literature.

3.5: Research strategy:

The research strategy is defined as a plan of how a researcher will go about answering his or her research question (Saunders, Lewis and Thornhill, 2012, pp. 173). Research strategy is the methodological link between their research philosophy and subsequent choice of collecting data and analyzing it. The different research traditions have led to a number of research strategies, they are: Experiment, Survey, archival research, case study, ethnography, action research, grounded theory, and narrative inquiry.

The research strategy used in this research is **Survey strategy**. Survey strategy is a popular and common strategy in business and management research and is frequently used to answer what, who, where, how much and how many questions (Saunders, Lewis and Thornhill, 2012, pp. 176). Surveys using questionnaires are more popular as they allow the collection of standardized data from a sizeable population. The questionnaire, however, is not the only data collection technique that belongs to the survey strategy. Structured observation, of the most frequently associated with organization and methods research and structured interviews are also often fall into this survey strategy (Saunders, Lewis and Thornhill, 2012, pp. 178).

This methodology will be advantages in this research, for the reason that it will discover answers by the way of structured interviews, i.e. analysis of data [Saunders, Lewis and Thornhill, 2006, pp. 142]. This research is about implementing cloud based services for e-learning systems. Cloud based services for e-learning is a development strategy in India, only few e-learning providers using these services. The information collected from interviews is analyzed and broken down and final conclusions are drawn. Moreover, this is a qualitative research, it will be important to question the experts in the field of cloud computing and professionals in e-learning services company. The plans which are observed from these structured interviews would be dissected and final conclusions are focused based on their answers.

3.6: Research's choice

The research choice of this dissertation is **mono method**. The basic choice between using the single data collection technique and corresponding analytical procedure already discussed either qualitative or quantitative is known as mono method (Saunders, Lewis and Thornhill, 2012, pp. 16).

The data collection method is based on a set of formal interviews [Saunders, Lewis and Thornhill, 2006, pp. 145]. The interview meeting is the most appropriate choice, because the developing technologies like e-learning cloud need a clear understanding to implement. These interviews help to understand clearly what are the key factors associated with cloud based e-learning system and what are the main advantages and challenges facing by

educational institutions while implementing cloud based e-learning. These data are very much crucial while driving at the final conclusion.

3.7: Time horizon:

This research is **cross sectional time horizon**. Cross sectional study is the study of a particular phenomenon at a particular time (Saunders, Lewis and Thornhill, 2012, pp. 190). Cross sectional studies may also use qualitative strategies, example, many case studies are derived from the interviews conducted over a short period of time (Saunders, Lewis and Thornhill, 2012, pp. 190). The interviews are conducted by the e-learning and cloud computing experts in e-learning industry and colleges, the information is gathered within the particular span of time and analyzed to derive at the final conclusion.

3.8: Selecting respondents:

The sampling method followed in this research is **non-probability sampling**. Non probability sampling provides the range of alternative techniques to select samples, the majority of which include an element of subjective judgement (Saunders, Lewis and Thornhill, 2012, pp. 281). To answer the research question and to meet objective researcher may need to undertake in-depth study that focuses on a small number of cases, perhaps one selected for a particular purpose. This non probability sample will provide researchers with the information rich case study in which researcher explores their research question and gain theoretical insights (Saunders, Lewis and Thornhill, 2012, pp. 283). In this research, practitioner experts are being interviewed.

The primary data used in the research is in the form of semi structured interviews. The interviews are conducted with the following people

- E-learning professionals working in e-learning service provider company, they deliver e-learning service to many educational institutions and various organizations throughout India and globally. So they can provide me the required information on the

advantages of using cloud based solutions for e-learning systems and whether the start-up educational institution can use cloud based e-learning systems.

- Cloud based e-learning experts working on management side in educational universities will provide the answers for key factors influencing and problems faced by them to adopt cloud based services for e-learning systems.

The respondents are selected using purposeful sampling because selected respondents need to have relevant expertise in both e-learning and cloud computing fields. The selection process of relevant experienced respondents through the help of LinkedIn social networking site. The selection is based on their experience in e-learning field and cloud computing services.

E-learning experts chosen for the interview are

1. Shantanu Rana, co-founder Eduvative Technologies LLP
2. Rishikesh Patankar, General Manager at CSC e-governance India Ltd.
3. Rajagopalan Varadan, CEO EDcellence.
4. Rahul Soni, Cloud solution architect at Brainsmiths consultant private limited.

Cloud based e-learning experts chosen are:

1. Ravindra Dastikop, Director for web enabled e-learning. SDM college of Engineering and technology
2. Jonah Timothy, Advisor e-learning systems. R.M.D. Engineering college

This non probability sampling suggests that it is possible to answer the research questions and to accomplish goals that indulge researcher to gauge from the selected respondents from the example [Saunders, Lewis and Thornhill, 2006, pp. 207]. The research conducted using qualitative research methods. Because, to understand the key factors influencing cloud based e-learning systems, it would be necessary to interview the e-learning professionals working in e-learning industry and internal colleges experts. The research question can the cloud based e-learning systems used by start-up organization also be answered by both e-learning experts

working in e-learning service providers and internal college experts. The problems associated while adopting cloud based e-learning systems, asked to e-learning experts working in the colleges. Exactly because they know the issues related to cloud based e-learning. Through a formal and structured interview, information can be obtained. The primary data is going to be collected from the formal interviews.

3.9: Research ethics:

Ethical concerns emerge as researcher design and plan their research, seek access to the organizations and to individuals, collect, analyze, manage and report their data (Saunders, Lewis and Thornhill, 2012, pp. 226). In the context of research, ethics refers to standards of behavior that guide researchers conduct in relation to the rights of those who became the subject of researcher work,

For this research, there are many ethical problems which I faced during personal interviews with the e-learning and cloud professionals. Because, they are not so much interested in spending, voluntary time and also they are not ready to answer all the questions which I asked them, because the cloud based services are new in e-learning field in India. These questions require detailed explanations from the experts to understand better about this e-learning field. The important ethical issue is that few e-learning professionals are not willing to provide me with the information I need for my research. Another issue was getting an appointment with them, because of their busy work schedule. Not only that, I did not get enough time to discuss everything based on the cloud based e-learning system because of the little time frame that they allocate for the interview with me. To handle these issues, I was very quick and efficient while interviewing them to utilize the appointment given and gathered as much as information related to the research questions.

3.10: Data collection instruments:

The study was conducted using qualitative research methods. Because to understand the process of e-learning using cloud services it would be necessary to interview the e-learning and cloud professionals in this field through a formal and semi-structured interview.

The primary data is collected from the semi structured interviews. In semi structured interview, the researcher will have a list of themes and possibly some key questions to be covered, although their use may vary from interview to interview (Saunders, Lewis and Thornhill, 2012, pp. 374). The order of questioning may differ from one interview to other and additional questions required to explore research question. So, the semi structured interview was conducted by the e-learning experts and internal college e-learning experts in e-learning to gather data which is relevant to the research questions. Because the respondents were in India, a telephonic conversation was conducted and recorded using call recording software.

Semi structured interviews also provide the opportunities to probe the answers, where researcher wants their interviewees to explain, or build on, their responses (Saunders, Lewis and Thornhill, 2012, pp. 378). So, these semi structured interviews provides the opportunities to derive at a conclusion based on the e-learning experts point of view.

The sampling method would be non-probability sampling. Non probability sampling provides the range of alternative techniques to select samples, the majority of which include an element of subjective judgement (Saunders, Lewis and Thornhill, 2012, pp. 281). The sampling size is 6, since it is a semi structured interview. The sampling size consists of four e-learning professionals from various e-learning providers across India and two Cloud computing based e-learning professionals in educational institutions in India. These respondents were selected with their huge experience in the e - learning field and having more knowledge of cloud based services for e-learning systems. Each of the respondents has a minimum ten years of experience in the e - learning industry. So, they can provide more relevant information with respect to the research questions. More information needed to gather from the respondents which allow me to draw a better and clear conclusion.

The secondary data contains both the qualitative and quantitative data, which is used in describing and explaining [Saunders, Lewis and Thornhill, 2006, pp. 248]. The secondary sources of information are obtained from the following

- Journals of previously conducted studies in the field of cloud based e-learning systems.
- Case studies are more important in understanding the process of implementation of cloud e-learning systems.
- E-resources also provide the valuable information about the cloud based e-learning in educational institutions in India.

These sources are freely available and can be accessed from any place. These sources help to understand the theories and inquires done before related to the topic and allow me to gain more knowledge about the topic. Because, semi structured interviews alone not be sufficient enough to derive at a conclusion.

3.11: Data analysis procedure:

According to Saunders, Lewis and Thornhill (2012), there is not a standardized method to analyze the qualitative data. A key determinant of the approach will be depending on whether the researcher commences their research inductively or deductively. Authors Saunders, Lewis and Thornhill (2012), outlined a specific generic approach to analyze the qualitative data that follow the below five points:

1. Identifying categories or codes that allow researcher to comprehend the data
2. Attaching data from the different sources to appropriate categories to integrate these data
3. Developing analytical categories to identify relationships and patterns.
4. Developing testable propositions
5. Drawing and verifying conclusions

The study is qualitative research method which involves analyses of the number of participants. The theme of this study is to analyze the key factors influencing while implementing cloud based services for e-learning systems in educational institutions in India.

Then to identify whether cloud based e-learning can be used by start-up educational institutions in India and also to find the benefits and problems associated with cloud based e-learning in educational institutions in India.

During the data analysis procedure, initial step is to categorize the data according to the research questions and research objectives. So, categories in this research will be key factors influencing while deploying cloud based e-learning in India, Can cloud based e-learning be implemented by start-up educational institutions in India, Benefits of using cloud based e-learning systems and finally Limitations of cloud based e-learning. Then an additional data attached from various sources like literature review and also effectively reduced and rearranged the data into manageable and comprehensible form. Then next step is to provide an explanation of the research question and objectives that form the focus of the research. Then developed a testable proposition and derived at a final conclusion.

3.12: Limitations of methodology:

The time duration to complete this dissertation was limited and certain efforts were required. The time management of personal activities, online research, research using library books and manage to contact suitable people for interviews was a problem. At the given time responses received from the respondents were very less. Only 6 respondents agreed to give an interview and since they are working in India, only telephone interviews were conducted.

The professionals working in cloud based e-learning service side is very less in India, so it is difficult to get an appointment with them.

Finally, respondents did not provide information about which cloud service they are used to provide e-learning service. This is highly confidential to them so they did not answer properly.

Chapter 4: Data Analysis and findings

In this chapter, the findings of the study obtained through the semi structured and formal interviews conducted by e-learning professionals and cloud computing professionals working in e-learning service Providers Company and educational institutions. Analysis drawn from the consequences of meetings is included, which helps to find answers the research question of this study and derive at the conclusion of this study.

4.1: Data collection and sampling:

The research needs collection of information from many sources, both primary and secondary. The primary data used in the research is in the form of formal and semi structured interviews. The interviews were conducted with the following people

- E-learning professionals working in e-learning service provider company, they deliver e-learning service to many educational institutions and various organizations throughout India and globally. So they can provide me the required information on this study.
- Cloud computing professionals working in the management side in educational universities will provide the answers to challenges faced by them to adopt cloud based services.

The professionals have deep knowledge in their respective fields. The formal interviews were more helpful to know about respondent's point of view of research questions. Also, data gathered from the interviews are vital in deriving at the final conclusions.

4.2: Results from the interviews:

Detailed information about the cloud based e-learning system was asked to the respondents and the analysis of interview with respect to the questions interviewed is given below. The complete transcripts of the interviews conducted are mentioned in the appendices. The

interviews conducted were telephonic interviews because the respondents are working in India.

The respondents were experienced e-learning professionals and cloud computing professionals from various e-learning service provider company and educational institutions across India, The questions asked of them are mostly in common. These interview questions and answers are attached in appendices interview 1, 2, 3, 4, 5 and 6. There responses are as follows:

E-learning experts chosen for the interview are

1. Shantanu Rana, Co-founder Eduvative Technologies LLP
2. Rishikesh Patankar, General Manager at CSC e-governance India Ltd.
3. Rajagopalan Varadan, CEO EDcellence.
4. Rahul Soni, Cloud solution architect at Brainsmiths consultant private limited.

Cloud based e-learning experts chosen for the interviews are:

1. Ravindra Dastikop, Director for web enabled e-learning. SDM college of Engineering and technology
2. Jonah Timothy, Advisor e-learning systems. R.M.D. Engineering college

1) Key influencing factors to be considered while deploying cloud based e-learning.

Shantanu Rana: Security and performance are the main factors to be considered while choosing a cloud based e-learning. If the organization has their own in-house infrastructure and organizations don't have to worry about the security. Performance related issues also to be analyzed before deploying the cloud based e-learning.

Scalability and customizability are also to be considered while deploying cloud based e-learning. Not that every course should be deployed on the cloud which depends on the

curriculum and content to be delivered. Capability of the system itself like what type of data it can be handled.

Rishikesh Patankar: If many users are accessing the data, then cloud based e-learning is an advantage, it will be very helpful in scaling the computer resources according to the demand. The amount of users must be analyzed before considering the cloud e-learning.

Security needs to be analyzed before deploying the cloud based e-learning. Connectivity and performance related issues also to be considered before adopting cloud.

Rajagopalan Varadan: Cost and security required to be considered while deploying cloud based e-learning. Before deploying cloud services an organization needs to do a research on the cost of service with different cloud providers. Security is the major factor to be considered while deploying cloud based e-learning systems. Because educational institutions must know who manages what before adopting cloud strategy.

Rahul Soni: Scalability need to be considered before deploying the cloud based e-learning systems. Because whenever the organization needs to expand its service cloud provider should support with the computing resources. The performance also a major factor because the content must be delivered anytime required by the users. Network bandwidth also to be considered before deploying cloud based e-learning systems.

Ravindra Dastikop:

Accessibility need to be considered because students must access the content from anywhere and anytime. Security is the major factor to be considered before deploying cloud based services. Since, anyone can access the information and share the data with their competitors for money. Technical issues like server downtime and bandwidth issues also to be considered before deploying the cloud based e-learning.

Jonah Timothy:

Scalability is the key factor to be considered before deploying the cloud based e-learning, because if a huge number of users accessing the same content it is better to deploy the content on the cloud. Because system maintenance and security part are taking care of cloud service provider. Security is also a major factor to be considered before adopting cloud based e-learning. The educational institutions should analyze the security issues and make a perfect deal with cloud service providers to avoid this issue.

According to First interviewee security, scalability, performance and customizability are the key factors needed to be considered while deploying cloud based e-learning. Second interviewee says that security, scalability and connectivity are the key factors influencing. Then, the third interviewee said that cost and security are the key factors that need to be considered and analyzed before deploying the cloud based e-learning systems. Fourth interviewee says that scalability and performance are the key factors to be considered. Fifth interviewee said that accessibility, security and network bandwidth to be considered before deploying cloud based systems. The final interviewee said that Scalability and security are the key factors to be considered while deploying cloud based e-learning system.

So, the e-learning experts working in e-learning service provider industry suggests that scalability, security and performance are the key factors that influencing while adopting cloud based e-learning systems. Then e-learning experts working in colleges said that network bandwidth, scalability and security are the key factors to be considered. Scalability plays a main role while adopting cloud based e-learning. Because, in cloud based e-learning systems users can increase the computing resources according to their needs and number of users accessing the systems and if there is no scalability, then the system performance will get affected due to the fixed computing resources. This is the main reason there are many colleges adopting cloud based e-learning. Security is always a concern in cloud computing, likewise in cloud based e-learning security is the key factors that every organization will analyze before deploying the cloud based e-learning. But experts said that many educational institutions started adopting cloud based services for e-learning systems.

2 Can Cloud based e-learning implemented by start-up institutions.

Shantanu Rana: Convenient through long time when the start-up institutions adopt cloud based e-learning at the beginning itself. Because the e-learning system is built upon the user requirement. This is convenient to the educational institutions also because everything is online. There is no much paper work required and everything is accessed via online. Today's generation students would love technology generally. So the cloud e-learning will provide more benefits for students and as well as management because of rapid growth in the business. The future of education is cloud based e-learning because of low cost service.

Rishikesh Patankar: Initial payment is very low to start up with cloud based e-learning systems. If it is a traditional model the educational institutions need to invest more on IT infrastructure. The start-up organization implementing cloud based e-learning will spend only minimal cost for infrastructure and system maintenance. So, it is better to implement cloud based e-learning rather than adapting after a few years. Nowadays, almost every institution and universities are changing their method of teaching to provide quality education to their students with the latest technologies.

Rajagopalan Varadan: Cloud based e-learning should be implemented by start-up educational institutions because they can provide courses without having complete infrastructure. They can use the computing resources according to their needs which will reduce the capital expenses. Every organization which is starting newly should cut their expenses to avoid risk, in this way cloud based e-learning provides efficient e-learning systems for educational institutions with low cost. Explained that students in India are not generally spending more time in class, more than 65 % they are spending outside the class either at home or other places. So, rather than using e-learning systems only in the premises, they can access cloud based e-learning systems online at anytime, anywhere and using any device. This will increase the student results as well.

Rahul Soni: The start-up organization should consider cloud based e-learning systems because the scalability is the main advantage of these systems. The institution's management

can concentrate on their business development measures rather than dealing with the issues in infrastructure side. For start-up institutions, cloud e-learning will reduce most of the risk to the management. Government should take steps to improve e-learning systems and help start up organizations to provide quality education to students. Government bodies should also need to improve the network bandwidth across the country, mainly in rural areas.

Ravindra Dastikop: If the institution is starting from scratch it is better to implement cloud based e-learning, because students will get more benefits using cloud e-learning. E-labs can be beneficial for students using cloud servers. Students will get more practical knowledge with the latest technologies which are very important for their career. Cloud based e-learning is the developing trend across the globe, so it will be the future of educational systems.

Jonah Timothy: Start-up institutions should make use of cloud based e-learning because the capital expenses will be reduced. Cloud e-learning will be advantageous to an organization with cutting power cost, system administration cost and additional infrastructure cost.

According to first interviewee, it is convenient if an institution adopts cloud based e-learning system because the system developed according to the requirements of the user. Then the infrastructure cost also will be reduced for the user. Second interviewee said that Initial payment is very low to start up with cloud based e-learning systems. The third interviewee said that Cloud based e-learning should be implemented by start-up educational institutions because they can provide courses without having complete infrastructure. Forth interviewee says that the start-up institutions should consider cloud based e-learning systems because the scalability is the main advantage of these systems. Fifth interviewee said that if the institution is starting from scratch it is better to implement cloud based e-learning, because students will get more benefits using cloud e-learning. Sixth interviewee said that Start-up institutions should make use of cloud based e-learning because the capital expenses will be reduced.

After analyzing both e-learning experts in e-learning service industry and experts in colleges, start-up educational institutions can use cloud based e-learning because of the main

advantage of reduction in initial capital expenses. Experts also said that cloud based e-learning is the future of educational systems.

3 The benefits of using cloud based e-learning for educational institutions and students in India:

Shantanu Rana: Respondent explained that infrastructure cost will be reduced and it would take care by the cloud service provider. The major investment will be reduced by the cloud service provider which is the one most often every organization is thinking when it try to adopt any new technology.

Cloud based e-learning is more flexible for students and management when compare to traditional mode of e-learning. Because, using cloud based e-learning education institutions can provide distance education as well. So, students can learn from their own device without going to classes always. They can access their content from anytime and anywhere.

Students love technology, today's students are technology study generation. So, cloud based e-learning will enrich the technical skills of students.

Rishikesh Patankar: Basically cloud based e-learning is accessible throughout the globe, so there are more possible that educational institutions can expand their business globally. Second one is scalability; in cloud based e-learning systems the increase in the number of users will be taken care of the service provider. If it's a traditional e-learning model, if there are more number of users added than the admin team need to add more computing resources and it will be a huge problem for the institution.

Security issues will also be covered by cloud service provider, so there is no much risk regarding content security.

Rajagopalan Varadan: Explained about cloud computing first. Respondent said that cloud computing is a way of providing services over the network and its primarily service based technology. Respondent quoted an example to define cloud computing "if a customer goes to

a restaurant he will not worry about the kitchen or what are the things available or he will not worry about cleaning or he will not worry about serving, he has just ordered the item required from the catalogue, they will provide what he need". So the institutions do not require complete infrastructure to host their content on the cloud. They need to pay for what they are using. IT infrastructure issues will also be taken care by the cloud provider.

Students while doing their projects, they need to submit proof of concept kind of research for that they require the proper infrastructure in the institutions. Cloud providers like Amazon Web Services AWS, Google computing, Microsoft Azure, etc., will provide some part of environment on demand for low cost. So, educational institutions can provide these functions using cloud based e-learning to their students. Students can be up to date with the latest technologies. Students can spend more time on studies if institutions adapt cloud based e-learning. Because, students can access the e-learning system from anytime and anywhere with their own device.

Flexibility of distributed infrastructure will be available to the educational institutions without having to spend for additional infrastructure.

The educational institution will spend less cost on power, system administration if they use on demand cloud service.

Employability process will get better in the universities if they use cloud based e-learning system. Because, students can work practically with the latest technologies while studying. The same technologies are used by companies in real time.

So, the educational institutions which are adopting cloud based e-learning system can have better infrastructure with low cost, increased rate of student results, growth in employability rate and educational institutions can expect more from students because they are giving more.

Rahul Soni: Online learning systems are more interested way of learning for students than the traditional mode. If the educational institutions adopt cloud based e-learning then students can access their content from anytime and anyplace via online. So, students would spend more time for studies than the traditional systems.

The cost to the universities will be reduced; the content which is placed in the cloud can be shared and distributed across the country. Example, Amity University, which has many

branches across India, Students registered for same course across various locations in the country will access the same materials. So the cost will be reduced for the existing institutions if they adopt cloud based e-learning.

Scalability is a major advantage of using cloud based e-learning.

Ravindra Dastikop: Accessibility across different location is a major advantage of adopting cloud based e-learning because in traditional mode it is constrained to the organizational campus. Using cloud based e-learning educational institutions offer both on campus and off campus courses. In India BITS Pilani university is offering both on campus and off campus courses which is very helpful for students.

Purchasing, installing and maintaining the hardware will be taken care by the cloud service provider. Users will pay through subscription model, so definite cost will be reduced to the educational institutions.

Ability to share data is also a main advantage of using cloud based e-learning because data loaded on the cloud can be accessible all time and they can use the same for coming years.

Jonah Timothy: Scalability is a more important advantage of cloud based e-learning because the organization can expand their business across worldwide. In traditional e-learning if number of users are added suddenly than the system will get slower and the streaming quality of content is also not proper. But in cloud based e-learning the scalability of computing resources will allow the system to react as same even with n number of users.

Then the cost of implementing cloud based e-learning also very low for educational institutions. There are lots of free, open source LMS and much free educational service is provided by the cloud providers.

According to first interviewee, the infrastructure cost will be reduced to educational institutions and students can access the content and students' technical skills will get enrich if the institution uses cloud based e-learning systems. Then, second interviewee said that Scalability, accessibility are the main benefits of adopting cloud based e-learning and he also

mention that security issues will be covered by the cloud service provider. The third interviewee said that Institutions do not require complete infrastructure to host their content if they use cloud based e-learning, educational institutions spend less cost on power, system administration if they use on demand cloud service and also increased the rate of student results, growth in employability. Fourth interviewee said that students will get benefited by spending more time on their studies and the cost to the universities will be reduced. Fifth interviewee said that accessibility across different location is a major advantage of adopting cloud based e-learning and infrastructure maintenance cost also reduced. Sixth interviewee said that scalability and cost reduction are the main benefits of using cloud based e-learning systems.

So, the most common advantage mentioned by e-learning experts while adopting cloud based e-learning system is cost reduction. Cost reduction is the main factor that many educational institutions are concerned about, but at the same time quality and performance of delivering content are important. Experts say that only cloud computing can provide both at the same time. Apart from cost reduction scalability, accessibility and enrichment of student's practical skills also important advantages of adopting cloud based e-learning systems.

4 Limitations of cloud based e-learning:

Shantanu Rana: Educational institutions are not ready to host their heavy amount of data on cloud or any technology. Because, their data are maintained and delivered by third party service providers. The Cloud adoption strategy is also not regulated by any government bodies, so they are not ready to host their data on the cloud. Security is the major concern for cloud based e-learning systems; educational institutions are not ready to hand over their data.

Cost related issues also a major issue for adopting cloud based e-learning.

Rishikesh Patankar:

In Cloud based e-learning connectivity is the major issue, because normally the network bandwidth is not good in rural areas. So, connectivity is the main limitation of cloud based e-learning. Content at low connectivity areas is not accessible. Connectivity and speed are the major issues in cloud based e-learning.

Rajagopalan Varadan: Explained that lack of awareness in India about cloud based e-learning services is a major limitation. Educational institutions are not exposed to it and they are worried much about sharing their data. Educational institutions are not interested much in cloud based e-learning. The government bodies should take steps to educate more about cloud based e-learning.

Security is the most important issue for educational institutions. Because they do not know who manages their data.

Rahul Soni: Network bandwidth is the major limitation of cloud based e-learning. When the highest quality content is deployed in the cloud it should properly stream when the users need. But due to connectivity problem the content is not shared properly, so users are not much interested. Government needs to take steps to expand cloud e-learning. Because, cloud based e-learning is the future method of learning system.

Ravindra Dastikop: Technical issues are major limitations for cloud based e-learning. The guaranteed availability of cloud resources are not predictable by any organization and if the server is down then the data cannot be accessed in crucial times like an examination period. Then the bandwidth issue, if the connectivity is low the data cannot be loaded and performance will be reduced.

The learning curve is lacking for the institutions and they are not aware of cloud based e-learning. There are some tools and technologies the faculty has to be trained before deploying cloud based e-learning systems. Students also have to learn these tools and technologies.

Many faculty members are not interested in sharing their valuable information with everyone. Example, if the data is shared in cloud it can be accessible by anyone with their credentials, but there are lots of chances that someone may steal their data and use it. So it is also a limitation for cloud based e-learning.

Assessment factors also a challenge while the content is in the cloud, because hackers can hack the content and share the information. Paper valuation is also a challenge because anyone can access.

Jonah Timothy: Educational institutions are not interested to host their data on a cloud because of security reasons and lack of awareness about security also a major limitation for cloud based e-learning.

Network bandwidth also a major limitation for cloud based e-learning in India. Government should take necessary actions to solve the problem

According to the first interviewee, security and cost related issues are the major limitations of adopting cloud based e-learning. Since, educational institutions' data are maintained and delivered by third party service providers. Second interviewee says that connectivity is the main disadvantage of adopting cloud based e-learning system. For the reason that generally the network bandwidth is not good in rural areas. The third interviewee said that Lack of awareness and security are the barriers for adopting cloud based e-learning systems. Fourth interviewee mentioned that network bandwidth is the major limitation of cloud based e-learning system. Fifth interviewee said that technical issues and security problems are the major disadvantages of cloud based e-learning systems in India. Sixth interviewee said that network bandwidth and security concern are the major limitations of cloud e-learning.

So, by analyzing all the interviews security is the major limitation for adopting cloud based e-learning because their data are hosted and maintained by the cloud service provider. Apart from this network bandwidth is also a major disadvantage of cloud based e-learning system in India.

5 Universities using cloud based services in India:

Shantanu Rana: NIIT, Amity University is using the private cloud model and wisdom cloud LMS is purely cloud based which is used by many organizations and schools in India

Rishikesh Patankar: CSC e-governance, India is using Amazon web services S3 (simple storage service) and they are using a relational database system for main their database.

Rajagopalan Varadan:

Satyabama University, Tamilnadu is using desktop as a service which is implemented three years back.

Ravindra Dastikop: Amrita, NIIT and Ambani universities are using cloud based e-learning in India and many universities are implementing because the trend is towards cloud e-learning.

This question is asked to know which are all the educational institutions in India are using cloud based services for e-learning systems.

Chapter 5: Discussion: Analysis of interview:

Respondents were chosen because of their experience and expertise in the field of e-learning and cloud computing, it is evident from the interview that they proved a good understanding of cloud based e-learning services during the interviews. Through the interviews, it was possible to understand the key influencing factors in deploying cloud based e-learning systems and whether start-up institutions can use cloud based e-learning systems. Then, it is possible to derive the major advantages of implementing cloud based e-learning services for educational institutions in India, also advantages for start-up institutions and there are few limitations with respect to cloud e-learning, they are very limited and known reasons.

The key influencing factors in deploying cloud based e-learning:

The main research question of this research is to find the expert's point of view on key influencing factors to be considered in deploying cloud based e-learning systems for an educational institution in India. The key influencing factors are derived from the interviews conducted.

From the formal interviews conducted, all the interviewees are agreeing that scalability and security are the key influencing factors that educational institutions needed to be considered while deploying cloud based e-learning. Scalability is the key factor in cloud based e-learning because if the content provided by educational institutions is suddenly accessed by many users, system performance will get affected in traditional e-learning systems. To increase the performance, the institutions need to add more infrastructure for computing resources and it will cost educational institutions generally more in numbers. In a cloud based e-learning system user can increase or decrease the computing resources according to their need without significant additional cost required and users can pay for only what they use. Security is another key factor to be considered while deploying cloud based e-learning because their own data is hosted by a cloud service provider. The organization should analyze the security issues before adopting the cloud service, however security is always a concern in cloud computing. Although they mention about security concern, but everyone agreeing that cloud

based e-learning is the future of e-learning system. The organization must consider the key factors mentioned above before implementing the cloud based e-learning.

From the literature review, it is also evident that scalability and security are the main factors to be considered while deploying cloud based e-learning. According to Deepa, N. and Sathiyaseelan, R., (2012) scalability is related to cost because users can add users and other computing resource capacity if needed and required. Also educational institutions can reduce their resource capacity easily by adopting cloud based e-learning systems. The same point is mentioned by experts in e-learning field also.

Author Pund, B., Nair, S. and Deshmukh, P, (2012) mentioned that security is the key factor needed to be considered while deploying cloud based e-learning systems. Educational institutions needed to analyze the security issues such as:

- Data should be kept privately because anyone can access the system
- Files and documents will be back up regularly or daily
- Education institution must access all the data if needed to shift the provider's service
- The security level needs to be greater than in normal cases.
- Cryptographic methods are used to ensure only authenticated user accessed the system.

Data should be kept privately because anyone can access the e-learning system which is specifically mentioned by one of the practitioner experts in e-learning field. Cryptographic methods mentioned by the author to ensure only authenticated user access the e-learning system is also mentioned by one of the interviewee.

Cloud based e-learning be successfully implemented by startup education institutions in India:

The second research question of this research is to find whether cloud based services be successfully implemented by start-up educational Institutions in India. There are various evidences which support this research question.

From the formal interviews conducted, all the interviewees are agreeing that cloud based services can be successfully implemented by start-up educational Institutions in India. After analysing both e-learning experts in e-learning service industry and experts in colleges, start-up educational institutions can successfully implement cloud based e-learning system because

of the main advantage of reduction in initial their capital expenses. If it is a traditional model the educational institutions need to invest more on IT infrastructure. The start-up organization implementing cloud based e-learning will spend only minimal cost for infrastructure and system maintenance. Experts also mentioned that students will get more benefits using cloud e-learning like involving in practical study and technology side cloud e-learning is very useful to them. Experts also said that cloud based e-learning is the future of educational systems. So, Cloud based e-learning can be implemented by start-up educational institutions in India.

From the literature review, it is also evident that there are many reasons to support that cloud based e-learning can be used by start-up educational institutions in India. As per the cloud based framework mentioned on the page 21, the framework could work startup institutions with all the aspects mentioned would provide better e-learning systems. The advantages of cloud computing mass data storage, high performance computing capabilities, sharing mode of resources and ideal allocation resources will be used to create better e-learning systems for the startup institutions.

As per Sommer, T. and Subramaniam, R., (2013), Cloud based e-learning will require limited in house infrastructure which will reduce the administration functions for startup educational institutions which was mentioned by experts also.

As per the primary research, there is the scope of cloud based e-learning systems for startup educational institutions.

The advantages of cloud based e-learning system:

The literature review and interviews have provided more advantages for using cloud based e-learning for both educational institutions and students. The important discussion with the professional in e-learning and cloud computing sector is about the advantages of cloud based e-learning. This also provides answers to the sub question -what do the experts see as benefits for educational institutions while using cloud based e-learning. The respondents provide more answers which are almost same as which is mentioned in the literature review.

The main advantage which repeatedly found in both primary data collection and secondary data collections is regarding cost reduction factor. Cost reduction is the main factor that many educational institutions are concerned about but at the same time quality and performance of delivering content is important. Experts say that only cloud computing can provide both at

the same time. Educational Institution will spend less cost on power, system administration if they use on demand cloud service.

From the literature review, Author Sosinsky, B., (2011, p. 35) mentioned that the cloud computing's main advantage is that its ability to convert capital expenses to operational expenses. In cloud based e-learning systems, there are no capital expenses required, user should pay only for what they use. The Author Rhoton, J. (2011, p. 97) also mentioned that the most obvious benefit about cloud computing are around cost which is the top rated business objective for any educational institutions to provide quality based educational system. These were specifically mentioned by experts in cloud based e-learning fields.

Experts also mentioned that employability process will get better in the universities if they use cloud based e-learning system. Because, in the traditional mode of learning there is not much scope of using the latest technologies by the students both in the lab and in their projects. If cloud based e-learning is implemented, then students can use the latest technologies which are used by leading companies in the market on a subscription basis. So, these latest technologies will help the students while preparing for their interviews and while working in the company.

So, the educational institutions which are adopting cloud based e-learning system can have better infrastructure with low cost, increased rate of student results, growth in employability rate and educational institutions can expect more from students because they are giving more

Apart from cost reduction scalability, accessibility and enrichment of student's practical skills also important advantages of adopting cloud based e-learning systems. Accessibility factor in cloud based e-learning will definitely allow students to spend more time on their studies. Even though there are few limitations, advantages discussed by respondents outweighs the limitations.

Limitations of cloud based e-learning systems.

The primary data and secondary data collected provides few limitations for using cloud based e-learning which will affect the educational institutions and students. This also provides answers to the last sub question- what do experts see as the problems associated with implementing cloud based e-learning in India.

From the interviews collected, the major concern of using cloud based e-learning system is security. Educational institutions are not ready to host their heavy amount of data on cloud or any technology. Since, their data are maintained and delivered by third party service provider. Assessment factors also a challenge while the content is in the cloud, because hackers can hack the content and share the information. To overcome this concern, the user needs to choose the trustworthy cloud service provider in the market. Apart from security, network bandwidth also another limitation mentioned by the experts. Experts mentioned that to overcome bandwidth problem government has to take necessary action.

Author Masud, A., Huang, X. and Islam, R., (2014) mentions that Cloud based e-learning has numerous advantages over the traditional e-learning systems. But, security is the major concern in cloud based e-learning systems. This was specifically mentioned by experts in e-learning.

According to Rhoton, J. (2011, p. 102), A common problem for the adoption of cloud computing is security because service provider hosts the sensitive data. The user must consider the trust worthy cloud service provider. This point was also mentioned by the experts in e-learning field.

Interesting that security emerged as the key issue. Security issues will always be an issue in the cloud, but there is much ongoing research in security and it is emerging as less as an obstacle in cloud computing (Masud, A., Huang, X. and Islam, R., 2014).

Bandwidth as an issue in India, still a problem but there are strong government initiators towards tackling these problem (Ray, p., 2010).

Conclusion:

This research provides a clear insight on the expert's point of view for key factors to be considered while deploying cloud based e-learning systems and advantages and benefits for educational institutions in India. Scalability and security are the key factors that influencing cloud based e-learning systems in educational institutions in India. There are various advantages mentioned by experts, but the major advantages of choosing cloud based e-learning is cost reduction and accessibility for students, they can access their content anytime, anyplace and anywhere with the proper network. The main limitation of cloud based e-learning systems is security, but it is a well-known reason, educational institution can avoid this by choosing trust worthy cloud service provider. Then experts also mention that cloud based e-learning can be implemented by start-up educational institutions because of the numerous advantages provided by cloud computing services. Experts also said that cloud based e-learning is the future of educational systems.

Through the in-depth discussion with interviewees based on the advantages and limitations of cloud based e-learning, it is noted that advantages of cloud based e-learning outweighs the limitations, thereby ensuring that cloud based services enhances the efficiency of e-learning system. Also, it provides more advantages to the students by offering the latest technologies and educational institutions by providing better business enhancement. Therefore, it is clearly evident that cloud based services have a significant role in providing quality e-learning systems.

Nowadays everyone is using the Internet, especially in developing countries like India and China etc. Most of the teenagers and youngsters are using the internet to connect among them. Educational institutes also growing rapidly with different course day by day. This rapid growth of the internet can be used by educational institutions to provide e-learning systems to their students. For educational institutions to adopt e-learning systems in traditional ways are more costly and difficult to manage servers and employees for 24/7 support. So cloud based

e-learning systems will help the educational institutions to build low cost e learning systems in an effective manner.

Cloud computing as an exciting development and significant alternative in today's educational point of view. Cloud based services made an entire world of knowledge available to teachers and students from anywhere, anytime and any device. Even without standard classrooms, students and teachers can conduct the formal classes with the help of cloud based E-learning systems. Students and administrative personnel have the opportunity to quickly and economically access various application platforms and resources through the web pages on-demand. This reduces the cost of organizational expenses and provides more powerful functional capabilities. Therefore, cloud based-learning can be an efficient and effective system to help students obtain the 21st century skills and prepare them to succeed in the global information society.

6.1: Recommendations and Future Research:

In my point of view, cloud based e-learning system has more potential in terms of developing students technical skills and developing practical knowledge towards latest technologies available. Educational institutions in India should adopt cloud based e-learning systems which will provide more benefits to the management as well as students.

Accessibility factor which is a more important feature in cloud based e-learning systems that students can access their study materials at anytime, anyplace and anywhere. In India, education system is good by providing more knowledge to the students, if cloud based e-learning system is implemented in most of the colleges and universities then it will be more useful to the students to increase their knowledge practically. If the cloud based e-learning is implemented, then educational institutions will be benefited. Future research is focused on how to implement cloud based e-learning to provide blended e-learning systems. That might be suitable in different situations.

If cloud based e-learning is adapted by startup educational institutions, then employability and economic growth are the benefits. Future research would be gathering requirements for setting up blended e-learning systems for startup educational institutions.

The actual financial scope is beyond the scope of this dissertation. The next step of the research is actually what has to be spent on what.

The recommendations for future study would be conducting detailed interview with higher levels of management in educational institutions and e-learning service providers to analyze the problems involved in adopting cloud based e-learning systems in detail. Then need to identify the solutions to overcome these problems.

Self-reflection:

Although the duration of the MBA course which I selected was just one year, it has been a positive and rich learning experience from this course selected in Dublin Business School. I am from India and this system of learning experience is completely different from the system which is in my country. This learning system here I experienced was practical approach which is very useful to my future career. This MBA course provides me a nice international experience in my career. This course also helps to improve my communication skills by participating in group assignments and presentations given in both semesters.

I have background of information Technology and I worked in HCL Technologies for around three years. Then I decided to pursue MBA in cloud computing technology which will enrich my professional skills and helps me to work on management role in a good company. I enjoyed the learning experience in the modules such as theory of cloud computing, development content for cloud, business strategy, personal and professional ethics, performance driven marketing and International business management. I feel that theory of cloud computing and developing content for the cloud are the important modules, because I learnt about one of the latest technologies in the computing world. In my second semester for developing content in the cloud, I have successfully implemented Moodle in Microsoft Azure with the guidance of lecturers. At that time I had an issue while implementing the LAMP stack in Ubuntu OS and I came across that issue by researching about the problem critically with the research skills I developed during MBA course.

I like to mention that my presentation skills also developed through the course of this MBA. Because, in my previous experience I had a weakness to face public audience and to present any project data to my colleagues. But, now I am confident enough to present required data to huge audiences.

Modules such as theory of cloud computing and development content for cloud was the core subjects in my course which are more interesting and challenging at the same time. I have learned many concepts such as security in the cloud, European data protection law, Capital expenses and operational expenses in the cloud, Virtualization concept in cloud and developed knowledge on Amazon Web Services, Microsoft Azure and Google App engine. These modules are highly challenging and I did lots of research about these concepts to

complete assignments on time. I think I have spent most of the time on researching about these modules.

I significantly improved my English without any issues after joining this course. The pattern of assignments also new and I have gained different learning experience. But, I ensure that every time I submit my assignments on the given time. The resources in the library have been a great help to me in completing assignments on time. The library resources such as books and library systems where I can work peacefully to complete my work.

The dissertation being the important part of the course, I wanted to do a thesis on a most new and interesting topic. Also, I wanted to use my experience, this is the reason I choose my dissertation topic on implementation of a cloud based e-learning systems in educational institutions in India. Though there are various issues that I came across while finding the answers to the questions during assignments, I found the Five force analysis, Marketing mix and Belbin self-perception tool, were the main features that I recognized and discovered them to be valuable in my MBA course. But gathering information to my dissertation was hard because the idea is new and only a few IEEE papers and academic journals have been published related to this area. This made it much harder to gather relevant information on my thesis.

Another key challenge was in finding respondents and conducting formal interviews for my thesis. I was expecting to conduct more interviews than I did, but many people I contacted via LinkedIn and other sources did not reply properly. Finding the right respondents with relevant experience in e-learning and cloud computing field is a difficult part of my thesis. The interview with Mr Rajagopalan varadan, CEO, EDcellence was a wonder full experience because he provided me the full insight of what's going on in cloud based e-learning systems. He offered me an **internship** with is company as well, the position he offered was a product architect intern for six months. Overall, it was a good learning experience in contacting and interviewing those six experts in this e-learning field. I consider this research offers me an opportunity to work in the new developing cloud based e-learning field.

My mentor for thesis also liked my topic and she guided me in a right way to complete my dissertation on time. There are two competences which I selected in completing the secondary data research. They are

Prioritizing the relevant data:

In the present era, more data regarding any topic can be collected through various resources like IEEE papers, academic journal articles, Library books and academic databases. But prioritizing the relevant data related to the topic is more important. The prioritizing the appropriate data is a competency which I developed with my MBA course. So, I selected the relevant data for secondary data using this competency.

Dissection of secondary data:

This is also a main competency which I developed during my MBA course. The segmentation of data will always help you do research more about the topic and gain more knowledge. During my thesis, I segmented my secondary data into three parts and researched about each part which gains me more knowledge about the topic.

The skills of prioritizing the relevant data related to secondary research as indicated by the criteria mentioned above. This prioritizing skill provides a scope of important benefits, for example, efficient time saving and increasing the level of strength of secondary data findings. Even though, the required important information is gathered from the formal interviews, secondary research data also important to derive at a conclusion. The analyzing skills and decision making skill also enhanced while completing this dissertation. Since, a lot of analysis and crucial decisions were made to derive at an appropriate conclusion for my thesis. Lastly, my dissertation mentor had a positive role, who offered important and practical encouragement to accomplish the issues that emerged at distinctive phases of the study, specifically in the initial phase of the thesis. Through my coursework in MBA, I extremely enhanced my critical analysis skills. I have figured out how to persistently ask the question "why?" on various levels. I learnt to Challenge myself to research into content as deeply as would be sensible and unpack each delicate element to create a satisfying study.

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Appendix:

Interview transcript: 1st interview – Shantanu Rana:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Interviewee: Security and performance are the main factors to be considered while choosing a cloud based e-learning. If the organization has their own in-house infrastructure and organization don't have to worry about the security. Performance related issues also to be analyzed before deploying the cloud based e-learning.

Scalability and customisability are also to be considered while deploying cloud based e-learning. Not every course can be deployed in a cloud which depends on curriculum and content to be delivered.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: Convenient through long time when the start-up institutions adopt cloud based e-learning at the beginning itself. Because the e-learning system is built upon the user requirement. This is convenient to manage also because everything is online. There is no much paper work required and everything is accessed via online. Today's generation students would love technology generally. The future of education is cloud based e-learning because of low cost service.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Infrastructure cost will be reduced and it would take care by the cloud service provider. The major investment will be reduced by the cloud service provider which is the one most often thing every organization is thinking when it try to adopt any new technology.

Cloud based e-learning is more flexible for students and management when compare to traditional mode of e-learning. Because, using cloud based e-learning education institutions can provide distance education as well. So, students can learn from their own device without going to classes always. They can access their content from anytime and anywhere.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: Educational institutions are not ready to host their heavy amount of data on cloud or any technology. Because, their data are maintained and delivered by third party service providers. The Cloud adoption strategy is also not regulated by any government bodies, so they are not ready to host their data on the cloud. Security is the major concern for cloud based e-learning systems; educational institutions are not ready to hand over their data.

Interviewer: What are the universities using cloud based e-learning in India?

Interviewee: NIIT, Amity University is using the private cloud model and wisdom cloud LMS is purely cloud based which is used by many organizations and schools in India

Interview transcript: 2nd interview – Rishikesh Patankar:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Interviewee: The number of users is accessing the data, then cloud based e-learning is an advantage, it will be very helpful in scaling the computer resources according to the demand. The amount of users must be analyzed before considering the cloud e-learning.

Security needs to be analyzed before deploying the cloud based e-learning. Connectivity and performance related issues also to be considered before adopting cloud.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: Initial payment is very low to start up with cloud based e-learning systems. If it is a traditional model the educational institutions need to invest more on IT infrastructure. The start-up organization implementing cloud based e-learning will spend only minimal cost for infrastructure and system maintenance. So, it is better to implement cloud based e-learning rather than adapting after a few years.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Basically cloud based e-learning is accessible throughout the globe, so there are more possible that educational institutions can expand their business globally. Second one is scalability; in cloud based e-learning systems the increase in the number of users will be taken care by service provider. If it's a traditional e-learning model, if there are more number of users added than the admin team need to add more computing resources and it will be a huge problem for the institution.

Security issues will also be covered by cloud service provider, so there is no much risk regarding content security.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: In Cloud based e-learning connectivity is the major issue, because normally the network bandwidth is not good in rural areas. So, connectivity is the main limitation of cloud based e-learning. Content at low connectivity areas is not accessible. Connectivity and speed are the major issues in cloud based e-learning.

Interviewer: What are the universities using cloud based e-learning in India?

Interviewee: CSC e-governance India is using Amazon web services S3 (simple storage service) and they are using relational database system to main their database.

Interview transcript: 3rd interview – RajagopalanVaradan:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Interviewee: Cost and security required to be considered while deploying cloud based e-learning. Before deploying cloud services an organization need to do a research on cost of service with different cloud providers. Security is the major factor to be considered while

deploying cloud based e-learning systems. Because educational institutions must know who manages what before adopting cloud strategy.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: Cloud based e-learning should be implemented by start-up educational institutions because they can provide courses without having complete infrastructure. They can use the computing resources according to their needs which will reduce the capital expenses. Every organization which is starting newly should cut their expenses to avoid risk, in this way cloud based e-learning provides efficient e-learning systems for educational institutions with low cost.

Explained that students in India are not generally spending more time in class, more than 65 % they are spending outside the class either at home or other places. So, rather than using e-learning systems only in the premises, they can access cloud based e-learning systems online at anytime , anywhere and using any device. This will increase the student results as well.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Explained about cloud computing first. Respondent said that cloud computing is a way of providing services over the network and its primarily service based technology. Respondent quoted an example to define cloud computing “if a customer goes to a restaurant he will not worry about the kitchen or what are the things available or he will not worry about cleaning or he will not worry about serving, has just ordered the item required from the catalogue, they will provide what he need”. So the institutions do not require complete infrastructure to host their content on the cloud. They need to pay for what they are using. IT infrastructure issues will also be taken care by the cloud provider.

Students while doing their projects, they need to submit proof of concept kind of research for that they require the proper infrastructure in the institutions. Cloud providers like Amazon Web Services AWS, Google computing, Microsoft Azure etc., will provide some part of environment on demand for low cost. So, educational institutions can provide these functions

using cloud based e-learning to their students. Students can be up to date with the latest technologies. Students can spend more time on studies if institutions adapt cloud based e-learning. Because, students can access the e-learning system from anytime and anywhere with their own device.

The educational institution will spend less cost on power, system administration if they use on demand cloud service.

Employability process will get better in the universities if they use cloud based e-learning system. Because, students can work practically with the latest technologies while studying. The same technologies are used by companies in real time.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: Explained that lack of awareness in India about cloud based e-learning services are a major limitation. Educational institutions are not exposed to it and they are worried much about sharing their data. Educational institutions are not interested much in cloud based e-learning. The government bodies should take steps to educate more about cloud based e-learning.

Security is the more important issue for educational institutions. Because they do not know who manages their data.

Interviewer: What are the universities using cloud based e-learning in India?

Interviewee: Satyabama University, Tamilnadu is using desktop as a service which is implemented three years back.

Interview transcript: 4th interview – Rahul Soni:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Interviewee: Scalability need to be considered before deploying the cloud based e-learning systems. Because whenever the organization needs to expand its service cloud provider should support with the computing resources. The performance also a major factor because the content must be delivered anytime required by the users. Network bandwidth also to be considered before deploying cloud based e-learning systems.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: The start-up organization should consider cloud based e-learning systems because the scalability is the main advantage of these systems. The institution's management can concentrate on their business development measures rather than dealing with the issues in infrastructure side. For start-up institutions, cloud e-learning will reduce most of the risk to the management. Government should take steps to improve e-learning systems and help start up organizations to provide quality education to students.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Online learning systems are more interested way of learning for students than the traditional mode. If the educational institutions adopt cloud based e-learning then students can access their content from anytime and anyplace via online. So, students would spend more time for studies than the traditional systems.

Cost to the universities will be reduced; the content which is placed in the cloud can be shared and distributed across the country. Example, Amity University which has many branches across India, Students registered for same course across various locations in the country will access the same materials. So the cost will be reduced for the existing institutions if they adopt cloud based e-learning.

Scalability is a major advantage of using cloud based e-learning.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: Network bandwidth is the major limitation of cloud based e-learning. When the highest quality content is deployed in the cloud it should properly stream when the users need. But due to connectivity problem the content is not shared properly, so users are not much interested. Government needs to take steps to expand cloud e-learning. Because, cloud based e-learning is the future method of learning system.

Interview transcript: 5th interview – RavindraDaskitop:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Interviewee: Accessibility need to be considered because students must access the content from anywhere and anytime. Security is the major factor to be considered before deploying cloud based services. Since, anyone can access the information and share the data with their competitors for money. Technical issues like server downtime and bandwidth issues also to be considered before deploying the cloud based e-learning.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: If the institution is starting from scratch it is better to implement cloud based e-learning, because students will get more benefits using cloud e-learning. E-labs can be beneficial for students using cloud servers. Students will get more practical knowledge with the latest technologies which are very important for their career. Cloud based e-learning is the developing trend across the globe, so it will be the future of educational systems.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Accessibility across different location is a major advantage of adopting cloud based e-learning because in traditional mode it is constrained to the organizational campus. Using cloud based e-learning educational institutions offer both on campus and off campus

courses. In India BITS Pilani university is offering both on campus and off campus courses which is very helpful for students.

Purchasing, installing and maintaining the hardware will be taken care by the cloud service provider. Users will pay through subscription model, so definite cost will be reduced to the educational institutions.

Ability to share data is also a main advantage of using cloud based e-learning because data loaded on the cloud can be accessible all time and they can use the same for coming years.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: Technical issues are major limitations of cloud based e-learning. The guaranteed availability of cloud resources are not predictable by any organization and if the server is down then the data cannot be accessible in crucial times like examination period. Then the bandwidth issue, if the connectivity is low the data cannot be loaded and performance will be reduced.

The learning curve is lacking for the institutions and they are not aware of cloud based e-learning. There are some tools and technologies the faculty has to be trained before deploying cloud based e-learning systems. Students also have to learn these tools and technologies.

Many faculty members are not interested in sharing their valuable information with everyone. Example, if the data is shared in cloud it can be accessible by anyone with their credentials, but there is lot of chance that someone may steal their data and use it. So it is also a limitation for cloud based e-learning.

Assessment factors also a challenge while the content is in the cloud, because hackers can hack the content and share the information. Paper valuation is also a challenge because anyone can access.

Interviewer: What are the universities using cloud based e-learning in India?

Interviewee: Amrita, NIIT and Ambani universities are using cloud based e-learning in India and many universities are implementing because the trend is towards cloud e-learning.

Interview transcript: 6th interview – Jonah Timothy:

Interviewer: What are the key factors to be considered while deploying cloud based e-learning systems in educational institutions in India?

Scalability is the key factor to be considered before deploying the cloud based e-learning, because if a huge number of users accessing the same content it is better to deploy the content on the cloud. Because system maintenance and security part take care by cloud service provider. Security is also a major factor to be considered before adopting cloud based e-learning. The educational institutions should analyze the security issues and make a perfect deal with cloud service providers to avoid this issue.

Interviewer: Can cloud based e-learning be deployed by startup educational institutions in India?

Interviewee: Start-up institutions should make use of cloud based e-learning because the capital expenses will be reduced. Cloud e-learning will be advantageous to an organization in cutting power cost, system administration cost and additional infrastructure cost.

Interviewer: What are the benefits of using cloud based e-learning in educational institutions in India?

Interviewee: Scalability is a more important advantage of cloud based e-learning because the organization can expand their business across worldwide. In traditional e-learning if more number of users are added suddenly than the system will get slower and the streaming quality of content is also not proper. But in cloud based e-learning the scalability of computing resources will allow the system to react as same even with n number of users.

Then the cost of implementing cloud based e-learning also very low for educational institutions. There are lots of free, open source LMS and much free educational service is provided by cloud providers.

Interviewer: What are the limitations of using cloud based e-learning systems in educational institutions in India?

Interviewee: Educational institutions are not interested to host their data on a cloud because of security reasons and lack of awareness about security also a major limitation for cloud based e-learning.

Network bandwidth also a major limitation for cloud based e-learning in India. Government should take necessary actions to solve the problem.