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Cloud Computing Changing the Trajectory of Teaching Learning Process in Central and State Universities and Autonomous Colleges of India

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Abstract: **Cloud computing is the next stage in the Internet's evolution, providing the means through which everything-----from computing power to computing infrastructure, applications, business processes to personal collaboration ----can be delivered. Cloud computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application. The term "cloud computing" originated from the cloud metaphor and graphic that often represents the Internet on network diagrams, because cloud computing relies on applications and file storage that reside on a network: a local-are network, a district intranet, or the Internet itself. . The "cloud" in cloud computing can be defined as the set of hardware, networks, storage, services, and interfaces that combine to delivery aspects of computing as a service. Cloud services include the delivery of software, infrastructure, and storage over the Internet (either as separate components or a complete platform) based on user demand. Cloud computing offers many possibilities to developmental educators for its use, whether for communicating with students through social networking services like Face book, sending out updates via Twitter, providing online tutoring or having students collaborate on their writing using a wiki. Cloud computing has the potential to offer staff and students better services at a lower cost that the technology deployment models they are using now. The present research paper discusses about the models of cloud computing, application of cloud computing, benefits and disadvantages of cloud computing. The investigator also focuses upon the various challenges in implementation of cloud computing in higher education.**

Keywords: **Information technology, Cloud Computing, Higher Education, IaaS, PaaS, SaaS.**

I. INTRODUCTION

Cloud computing is not just a buzz-word, but it represents strong direction of Information Technology industry development. In the last couple of years, "*Cloud Computing*" has increasingly been discussed. This is a relatively new trend of Information Technology industry development, focused on users, and driven by the increasing use of various mobile devices such as laptops, tablet PCs and smart phones. Research has shown that it is one of the fastest growing sectors of the digital economy. European governments and industry plan to invest 45 billion Euros in the development of cloud computing by the year 2020. In cloud computing networks of remote servers, storage systems (data centers and server farms) and their resources are being used upon user request. The term "*cloud*" is used as a metaphor for the Internet since it doesn't matter where the hardware and software resources that are used are located. For IT professionals cloud computing is a new business model and a new technology platform for developing and deploying applications, and for end-users a new and cheaper way to use applications.

Speaking of cloud computing we should be able to distinguish three different models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). The scope of this work is a model of Software as a

Service. This represents the lease of computing resources on a network of remote servers where applications are executed and data is stored. The application of cloud computing is very broads and growing daily because of many advantages to the users, and is driven by the increasing use of various mobile devices (laptops, tablets and smart phones) and mobile Internet access being more available. In general it can be portrayed as a synonym for distributed computing over a network, with the ability to run a program or application on many connected computers at the same time. It specifically refers to a computing hardware machine or group of computing hardware machines commonly referred as a server connected through a communication network such as the Internet, an intranet, a local area Network (LAN) or wide area Network (WAN) and individual users or user who have permission to access the server can use the server's processing power for their individual computing needs like to run application, store data or any other computing need. Cloud computing is applicable in education, but it implies the acceptance of these services by all involved in the educational process.

Cloud computing provides shared resources, software and information through internet as a PAYGO (Pay-as-you-go) basis. Cloud computing is a kind of virtualization; thus also known as Virtualization Technology. Cloud computing and it benefits attracts several other field. Education Systems also interacts with educational applications for cloud computing. Cloud computing provides several benefits in educational systems such as creation of virtual teaching learning environment, making interactive and speedy smart classroom. It also minimizes the time of knowledge collection, model preparation and delivery. Thus, cloud computing has not only many advantages but also some limitations, both arising from the fact that all the data and applications are located somewhere on the Internet. It can be used in various activities of everyday life, including in education. In addition to providing students and teachers (usually fee of charge) access to may applications and services in the cloud, which can be used in formal and informal education, cloud computing allows for greater flexibility and mobility in the use of resources for teaching and learning, greater degree of collaboration, communication and sharing of resources, and creates a personalized learning environment of virtual communities of learning and teaching.

Cloud computing has the potential to offer staff and students better services at a lower cost than the technology deployment models they're using now. Saving money and improving efficiencies are two areas where schools can use all the help they can get. The term, "cloud computing" originated from the clouds metaphor and graphic that are often represent the Internet on network diagrams, because cloud computing relies on applications and file storage that reside on a network, a local area network, a district intranet, or the Internet itself.

The Background

John McCarthy opined in 1960s that, "*computation may someday be organized as a public utility*". Mid-2008, Gartner saw an opportunity for cloud computing, "to shape the relationship among consumers of IT services, those who use IT services and those who sell them" and observed that "organization are switching from company-owned hardware and software assets to per-use service-based models". On March Ist, 2011, International Business Machine (IBM) announced the Smarter Computing framework so as to support Smarter Planet. Among the various components of the Smarter Computing foundation, cloud computing is a critical piece. The cloud computing is considered as the 5th generation of architecture in the chronological order of their appearance: Mainframes (1970), Client-server (1980), Web (1990), SOA (2000) and Cloud (2010).

II. THEORETICAL FRAMEWORK

The cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction". Gartner defines cloud computing as a "style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies". For everyday users of the Internet and computers, cloud computing is any online activity, such as accessing data or using a software program, which can be done from different devices regardless of the on-ramp to the Internet. In this vision, the data or software applications are not stored on the user's computer, but rather are accessed through the web from any device at any location a person can get web access. For end-users, cloud computing means that you don't have to worry about maintaining hardware or purchase new equipment, obtaining software licenses, updating or upgrading existing software, data synchronization, etc. because all these are included in the "*cloud*" service. One cay sat that cloud computing is the new driver of IT revolution, in which new IT services are being developed, changing the ways

of access, usage maintenance and financing services on demand. Cloud computing is characterized by scalability (extent and amount of used resources according to the needs of application and paid on the actual use of resources), mobility and platform independency (the ability to access any time, from any location and device).

III. MODELS OF CLOUD COMPUTING

There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users.

Following are the working models for cloud computing:

I. Service Models

II. Deployment Models

I. Service Models of Cloud Computing

There are three types of service models of cloud computing which are as following:

1. Software-as-a-Service (SaaS): Software-as-a-service refers to the sue of various web-based applications that run and execute on the server. This type of model provides only hosted applications. By using this model, one can reduce the cost of hardware and the software development, maintenance and operations.

2. Platform-as-a-Service: This model involves the sue of the operating system and development tools in the cloud. In this model, the customer can develop his application on the provider supported platform. By using this model one can reduce the cost and full management complexity. The customer can manage his required software components of the platform. The development environment is determined by the cloud provider. The cloud customer has control over applications and application environment settings of the platform.

3. Infrastructure-as-a-Service: It is the hardware component with different forms of virtual technology rentals. In this model, the provider hosts the consumer's virtual machines and thereby provides networks and storage. By using this module the customer avoids purchasing and managing the hardware and software infrastructure components, and is provided with all resources virtualized through a service interface.

II. Deployment Models Of Cloud Computing

Deployment models define the type of access to the cloud, i.e., how the cloud is located?

Cloud can have any four types of access: public, Hybrid and Community.

1. Public Cloud

The Public cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. It allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.

2. Private Cloud

The Private cloud infrastructure is accessible for an organization only. It may be managed by the organization itself or a third party and can be internal or external. The party cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature.

3. Community Cloud

It is a cloud that is shared by several customers with similar security concerns and the same data and applications sensitivity. The community cloud allows systems and services to be accessible by group organizations.

4. Hybrid Cloud

This type of cloud model merges more than one cloud computing model into a single, hybrid model; using a public cloud for hosting sites that must be published and containing uncritical data, and using a private cloud for all the other sensitive or critical data or services. This scenario is good for economic and business requirements.

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IV. CHIEF CHARACTERISTICS OF CLOUD COMPUTING

Cloud computing has several characteristics, with major one are as following:

1. Shared Infrastructure

Uses a virtualized software model, enabling the sharing of physical services, storage and networking capabilities. The cloud infrastructure, regardless of deployment model, seeks to make the most of the valuable infrastructure across a number of users.

2. Dynamic Provisioning

Allows for the provision of services based on current demand requirements. This is done automatically using software automation, enabling the expansion and contraction of service capability, as needed. This dynamic scaling needs to be done while maintaining high levels of reliability and security.

3. Infinite scalability

A key feature of cloud computing is its rapid elasticity, allowing for sudden peaks in demand. If the school wishes to increased use suddenly then, there is no need to purchase additional hardware.

4. Network Access

It needs to be accessed across the Internet from a broad range of devices such as PCs, Laptops, and mobile devices, using standards-based APIs (for example, ones based on Hyper Text Transfer Protocol [HTTP]). Deployments of services in the cloud include everything from using business applications to the latest application on the newest smart phones.

5. Managed Metering

It uses metering for managing and optimizing the service and to provide reporting and billing information. In this way, consumers are billed for services according to how much they have actually used during the billing period. In short, cloud computing allows for the sharing and scalable deployment of services, as needed, from almost any location, and for which the customer can be billed based on actual usage.

Cloud Computing and its Role in Higher Education

According to Horrigan, J.B., "*The potential for cloud computing for improving efficiency, cost and convenience for the educational sector is being recognized by a number of educational establishments. For some universities, the availability of an awesome computing power through cloud computing for research purposes was welcome*". Many educational institutions have begun their movement to cloud computing by outsourcing their student email provision. Higher educational institutions are also beginning to use lower level cloud services for purposes such as data storage. This may be attractive where data security is of lower concern such as where video and audio is provided as Open Educational Resources (OERs).

Another role of cloud computing which is beginning to emerge in higher education is for hosting of institutional Learning Management Systems (LMSs) in the cloud. "*Outsourcing the provision of LMSs such as Blackboard or Modular Object Oriented Dynamic Learning Environment (MOODLE) to a third party makes sense for educational institutions who cannot justify the costs of purchasing, maintaining and supporting the hardware and software themselves (Gartner, 2013*)." Cloud computing is often associated with e-learning and m-learning. This refers to e-learning environment mainly distributed on the cloud, in which Open Educational Resources were produced, researched and shared by participants worldwide.

With applications in the cloud (SaaS), students and teachers can flexibly access their data via a web browser from a computer at home, school, library, student room or some other place, and achieved rapid and efficient communication, collaboration, exchange or share documents, contacts, notes, audio/video and other data. With their use students can create "*Cloud-Based Personalized Learning Environment*". "The first idea that comes to mind when assessing such a cloud space for learning, would be the creative potentials that could be shared, created and inspired (Kop, R., Carroll, F, 2011)". In addition to individual applications in the cloud, bundled applications are also available (eg. Google Apps for Education or Microsoft Live@edu with Office 365 and other applications for Education) that combine tools for communication and collaboration, office tools for working with documents, and space to store and synchronize data on

demand. University computing service department may be able to aim to achieve 99.5% availability for its educational services such as the LMS, Google offers 99.9% availability for its educational application suite and appears to outperform this target.

Using services and applications in the cloud, students and teachers can achieve mobility because their educational resources and necessary applications are available via portable computers and Inter-connected devices. For example, classes can be implemented outside the school/faculty or students can perform duties at various places.

Many problems like those in which students cram into a classroom can be solved with virtualization of the class environment. Students can actually log onto a space online and attend classes outside of the ineffective class environment. As such, the Professors do not have to stress themselves out with out-flowing classes beaming with crammed students. Instead, they can focus their attention to create content which students are able to understand, develop their skills and pass their examinations with flying colours. There are also other ways colleges can leverage on economies of scales outside the classroom. For instance, if the paper systems are replaced by distributed work management systems, the workload can be reduced substantially. This can also boost the rate at which they achieve efficiency needed to work optimally, just to name but, a few.

The nature of the cloud also allows students to share beyond ideas. They can share educational infrastructure and its related tools. With this in mind, colleges can spend less on new software, text books and latest-expensive quality material. This ensures that students and schools have their easy sharing of quality resources. This will not only help colleges leverage tight budgets, but will also enable students to access vital information. Eventually, this would boost their academic grades, learning experience and enforce collaboration, all of which will boost the overall quality of education. In general, education is wide and it has many functions, individuals and processes. Innovative tools like those hosted in the cloud can help optimize their functions, effectively. However, adequate planning and investment need to be invested to enable this transaction.

The applications of cloud computing are practically limitless and has it applications in almost all the fields such as business, entertainment, data storage, social networking, management, entertainment, education, art and global positioning system etc. With the right middleware, a cloud computing system could execute all the programs a normal computer could run. Potentially, everything from generic word processing software to customize computer programs designed for a specific company could work on a cloud computer system.

But now an important question is why anyone would want to rely on another computer system to run programs and store data? Here are just a few reasons:

1. Clients would be able to access their applications and data from anywhere at any time. They could access the cloud computing system using any computer linked to the Internet. Data wouldn't be confined to a hard drive on one user's computer or even a corporation's internal network.

2. It coiled bring hardware costs down. Cloud computing systems reduce the need for advanced hardware on the client side. One wouldn't need to buy the fastest computer with the most memory, because the cloud system would take care of those needs for us. Instead, one could buy an inexpensive computer terminal. The terminal could include a monitor, input devices like a keyboard and mouse and just enough processing power to run the middleware necessary to connect to the cloud system. One wouldn't need a large hard drive because one would store all our information on a remote computer.

3. Corporations that rely on computers have to make sure that they have the right software in place to achieve goals. Cloud computing systems give these organizations company-wide access to computer applications. The companies don't have to buy a set of software or software licenses for every employee. Instead, the company could pay a metered fee to a cloud computing company.

4. Server and digital storage devices take up space. Some companies rent physical space to store servers and databases because they don't have it available on site. Cloud computing gives these companies the option of storing data on someone else's hardware, removing the need for physical space on the front end.

5. Corporations might save money on IT support. Streamlined hardware would, in theory, have fewer problems than a network of heterogeneous machines and operating systems.

6. If the cloud computing system's back end is a grid computing system, then the client could take advantage of the entire network's processing power. Often, scientists and researchers work with calculations so complex that it would take years for individual computers to complete them. On a grid computing system, the client could send the calculations to the cloud for processing. The cloud system would tap into the processing power of all available computers on the back end, significantly speeding up the calculation.

Cloud Computing Challenges and Concerns

Perhaps the major challenges in cloud computing are security and privacy. The idea of transferring over important data to another company worries some people. Corporate executives might hesitate to take advantage of a cloud computing systems because they can't keep their company's information under lock and key. The counterargument to this position is that the companies offering cloud computing services live and die by their reputations. It benefits these companies to have reliable security measures in place. Otherwise, the service would lose all its clients. It's in the interest of the companies to employ the most advanced techniques to protect their client's data.

Privacy is another matter. If a client can log in from any location to access data and applications, it's possible the client's privacy could be compromised. Cloud computing companies will need to find ways to protect client privacy. One way is to use authentication techniques such as user names and passwords. Another is to employ an authorization format---each user can access only the data and application relevant to his or her job.

Some questions regarding cloud computing are more philosophical. Does the user or company subscribing to the cloud computing service own the data? Does the cloud computing which provides the actual storage space, own it? Is it possible for a cloud computing company to deny a client access to that client's data? Several companies, law firms and universities are debating these and other questions about the nature of cloud computing.

How will cloud computing affect other industries? There's a growing concern in the IT industry about how cloud impact the business of computer maintenance and repair. If companies switch to using streamlined computer systems, they'll have fewer IT needs. Some industry experts believe that the need for IT jobs will migrate to the back end of the cloud computing system.

Another area of research in the computer science community is autonomic computing. An autonomic computing system is self-managing, which means the system monitors itself and takes measures to prevent or repair problems. Currently, autonomic computing is mostly theoretical. But, if autonomic computing becomes a reality, it could eliminate the need for many IT maintenance jobs.

Another challenge is the lack of standards: Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that clouds will be interoperable. The Open Grid Forum is developing an Open Cloud Computing interface to resolve this issue and the Open Cloud Consortium is working on cloud computing standards and practices. The findings of these groups will need to mature, but it is not known whether they will address the needs of the people deploying the services and the specific interfaces these services need. However, keeping up to date on the latest standards as they evolve will allow them to be leveraged, if applicable.

Continuously evolving: User requirements are continuously evolving as are the requirements for interfaces, networking, and storage. This means that a "cloud," especially a public one, does not remain static and is also continuously evolving.

Compliance Concerns: The Sarbanes-Oxley Act (SOX) in the US and Data Protection directives in the European Union are just two among many compliance issues affecting cloud computing, based on the type of data and application for which the cloud is being used. The EU has a legislative backing for data protection across all member states, but in the US data protection is different and can vary from state to state. As with security and privacy mentioned previously, these typically result in Hybrid cloud deployment with one cloud storing data internal to the organization

V. BENEFITS OF CLOUD COMPUTING IN THE SECTOR OF EDUCATION

There is not an iota of doubt that the range of resources and services available via the cloud, whether they concern the IT infrastructure or the solutions they enable to be implemented, involves the introduction of new processes. There are several benefits and advantages of cloud computing in the sector of education, which are as following:

1. Savings

The cloud promotes the more efficient use of IT resources, in particular through:

- A reduction in costs through IT equipment, centralized on a cloud platform (with the virtualization of machines reducing the number of systems required); this delivers economies of scale (when there is sharing between various sites) and obviates the need for costly local infrastructures that are under-or over-sized, or not used to their maximum potential;
- a reduction in the cost of provision like software licenses, management skills, physical security of premises housing servers;
- a reduction in the size and complexity of the number of machines and programs to be installed at each site, and hence the cost of licenses and maintenance is less;
- a dramatic decrease in the number of applications to be installed and rolled out to the computers at each site because access is carried out remotely on a centralized application in the cloud for an unlimited number of users;
- The billing of services based on the actual use of resources (pay-per-use);
- Human resource savings (technical staff required to manage in-house machines); and
- Freeing up Capex budgets (the cloud involves the Opex [operational expenditure] model).

2. Upgrades Guaranteed

The cloud leads to improved "anti-obsolescence" insurance for IT solutions because it is able to cope better with the increasingly rapid in technologies. It also enables all documents—projects, homework, syllabuses, and collaborative exercises, for example—to be updated in a centralized and systematic manner and to be modified at a single central point. This helps to ensure that these documents are appropriate and relevant and that all the information they contain is identical for all users.

3. Flexibility

One of the main benefits of cloud-based Information Technology and teaching resources is that they help prevent the barriers to the progress that come form making individual investments in equipment because individual investments must, first and foremost, be made cost-effective before any upgrade or replacement can be envisaged. The centralized infrastructures in the cloud use various technologies that promote flexibility, including:

- Speed of adjusting to change: Centralizing and standardizing the available resources enables faster upgrades in line with technological progress and/or changes to demand and requirements;
- Smooth adjustment to ICT resources (e.g., servers, storage space, calculating power, application authorities, content) and how they are made available, thanks to the flexibility of the infrastructure and the ease of accessing resources based on needs (since, with cloud-based ICT, a new version of the application or any application software can be more easily distributed to users);
- Flexibility in implementing teaching content-including that for personalized learning, a customized teaching process that meets the needs and specific difficulties of each student or each profile of student; students are then able to draw from whole of the content available, as well as find the information and tools they are looking for, that are appropriate for their level of education;
- Flexibility in terms of the number of machines needed: Cloud architecture can potentially support every type of client hardware and application (albeit with a number of exceptions, depending on the service-provider);
- Self-service potential for students, teachers and education establishments; and
- Flexibility of learning, giving easy access to courses and content at any time, any place; options to learn outside the school itself, as well as outside of the school calendar (holidays, ongoing learning after-school/postgraduate training).

4. Effectiveness

The method of deployment that the cloud makes possible IT resources can also promote more dynamic exchanges and participation between teachers, pupils ands students, their social network and parents.

The methods that are available are more numerous and can lead to more productive and effective learning for the student (a rise in their level of understanding and achievement within their stage of education, increased chance of success, gaining a clearer view of the realities of their future working life, etc.). In terms of teachers' and resource administration, the cloud model encourages the pooling and implementation of good management practices.

5. Sharing

Skills, good practices, applications, teaching content and infrastructures can be poled and shared to avoid each establishment duplicating resources that exist elsewhere.

Sharing equipment also has the effect of harmonizing resources, making it easier to support them, and avoiding the problems of incompatibility or difficult integration between various tools and systems. Pooling quality teaching content also brings the prospect of removing and avoiding educational inequalities and the issue of "poorly performing" or "second-rate" schools. It promises fairer access to educational and learning resources. It is part of the solution for bridging he digital divided, promoting a new way of making education more accessible and, ultimately, avoiding highlighting digital inequalities rather than reducing them.

6. Practical scenario

The principles associated with cloud computing (centralized and optimized resources, consumables, resources on demand, resources with the ability to evolve, etc.) enable us to revise the way in which education establishments and students are able to use equipment, applications and content. All round the world, as well as here at home, initiatives are being created to make use of this method for making resources available. The way in which Education 2.0 is able to implement these initiatives may take many different forms. As examples, we have selected eight, theme-based scenarios that apply to various contexts, processes and situations. All are based on the reality or the premise of cloud techniques and technologies.

7. Virtual Lecture Theaters

Communication and collaboration technologies are bringing down the walls of the classroom, promoting exchanges, group work and inter-school projects. They are also enabling teachers in a different country to teach classes, complete with the required material, to classes locally. Such Information and Communication Technology is also enabling pupils of the same age located in distant towns or countries to share their experiences of class being taught online.

Platforms and content hosted in the cloud enable teachers to create collaboration spaces or forums where they can interact and invite colleagues to join in, whether they teach the same subject or not. This enables students to approach topics in a wider context. For example, a parallel or linked discovery made by Greek scientists, could be approached simultaneously by mathematics and historians.

8. Laboratories in the Cloud

Using a virtual laboratory, a cloud infrastructure can offer the resources for processing, calculating and simulations that are needed to create a compound, on demand (for a specific period of time and based on capacities sized according to needs). Pupils or students are able to carry out all of the virtual simulations or experiments that they want in it (chemistry, physics, social sciences, economics, etc.) from the simplest to the most complex, provided the required IT resources (calculating power, simulation tools etc.) are made available to them. This scenario is based on an adaptive system of ICT consumption.

9. Intelligent classroom

The intelligent classroom in the scenario of cloud computing includes:

- The availability of resources and applications in the cloud can benefit the quality and effectiveness of teaching at the classroom level. A few examples include:

➢ Access to courses, syllabuses, documentation and information regardless of where the student happens to be: in a classroom, in the school's open spaces, at home, traveling on public transport, or in the library;

➢ Individual access to the learning resources best suited to the student's needs, or to his or her learning difficulties, for example, with freedom of choice (or guided by the teacher);

- Opening the teaching resources of one establishment to the pupils and teachers of other institutions so that they can share good practices; and
- Centralizing the results of tests, examinations and homework, as well as teachers' assessments, so as to provide immediate identification of each student's difficulties and to place current results in context (e.g., compared with fellow students, as well as with their own personal academic history)

10. Mobile Accessible

Mobile workers have increased productivity due to systems accessible in an infrastructure available from anywhere;

11. One can access application such as utilities, over the Internet;

12. Manipulate and configure the application online at any time;

13. It does not require installing a specific piece of software so as to access or manipulate cloud application;

14. Cloud computing offers online development and deployment tools, programming runtime environment through Platform as a Service model;

15. Cloud resources are available over the network in a manner that provides platform independent access to any type of clients;

16. Cloud computing offers on-demand self-service. The resources can be used without interaction with cloud service provider;

17. Cloud computing is highly cost effective because it operated at higher efficiencies with greater utilization. It just requires an Internet connection.

VI. DISADVANTAGES OF CLOUD COMPUTING

1. Possible downtime: Cloud computing makes our small business dependent on the reliability of our Internet connection. When its offline, then we are offline and even the most reliable cloud computing service providers suffer server outages now and again.

2. Security issues: A very pertinent question is that How safe is our data? Cloud computing means Internet computing. So one should not be using cloud computing applications that involve using or storing data that one is not comfortable having on the Internet. That being said, established, reliable cloud computing vendors will have the latest, most sophisticated data security systems possible as they want our business data to be very secure and realize that data security is a big concern.

Switching to the cloud can actually improve security for a small business, says Michael Redding, managing director of Accenture Technology Labs. "Because large cloud computing companies have more resources, he says, they are often able to offer levels of security an average small business may not be able tom afford implementing on its own servers" (Outsource IT Headaches to the Cloud (The Globe and Mail).

3. Cost: At first glance, a cloud computing application may appear to be a lot cheaper than a particular software solution installed and run-in house, but one need to be sure that we are comparing apples and apples. But an important question is that does the cloud application have all the features that the software does and if not, then are the missing features important to us?

One also need to be sure while one is doing a total cost comparison. While many cloud computer vendors present themselves as utility-based providers, claiming that one is charged for what one uses. Gartner says that this isn't true; in most cases, a company must commit to a predetermined contract independent of actual use. To be sure that one is actually saving money or not, one has tom look closely at the pricing plans and details for each application.

Gartner also points out that the cost savings of cloud computing primarily occur when a business first starts using it. SaaS (Software as a Service) applications, Gartner says, will have lower total cost of ownership for the first two years because SaaS applications do not require large capital investment for licenses or support infrastructure. After that, the on-premises option can become the cost-savings winner from an accounting perspective as the capital assets involved depreciate.

4. Inflexibility: Be careful when you are choosing a cloud computing vendor that you are not locking your business into using their proprietary applications or formats. One can't insert a document created in another application into a Google Docs spread sheet, for instance. Also make sure that one can add and subtract cloud computing users as necessary as our business grows or contracts

5. Lack of support: These issues need to be resolved before cloud computing becomes ubiquitous, (Open Forum). Anita Campbell writes, "Customer service for Web apps leaves a lot to be desired—Too many cloud-based apps make it difficult to get customer service promptly---or not at all. Sending an email and hoping for a response within 48 hours is not an acceptable way for most of use to run a business".

VII. CONCLUSION

Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the Internet. Cloud computing represents a new model of providing Information Technology services which includes rental of resources located somewhere in the "cloud" and is considered to be the direction of future development of the IT sector. Basically it is Internet based computing in which shared resources, software and information are delivered as a service that computers or mobile devices can access on demand. The rise of cloud computing is rapidly changing landscape of information technology and ultimately turning to the long held promise of utility computing into a reality in the information age. Today cloud computing is used extensively in higher education. Free or low cost cloud based services are used daily by learners and educators in order to support learning, social interaction, content creation, publishing and collaboration.

There was a time when to use files like word processing files, spread sheets, etc., on different computers, one needed to save their files on a thumb drive or Compact Disc ROM disk. The disk or drive then traveled around with them so they could load their information onto other computers while holding their breath until the document or Power Point slide actually returned. Now with cloud computing in place, this problem is not any longer remaining. The safety, stability and ease-use, cloud computing in education is resulting in wide-spread adopting of it in educational institutions of all sizes and types.

Cloud computing usability in higher education is broad, as recognized by many educational institutions around the world. The reasons for the worldwide introduction of cloud computing for educational establishments are mainly of financial nature, but it should be noted that, "cloud" has creative potentials because it enables that ideas, thoughts and knowledge can be created, used and shared easily.

Cloud computing can bring cost savings. Server consolidation significantly reduces power and management costs, while increasing productivity for IT. Many open-source and Internet browser-based applications are available for free to educators. Licenses are still required; however for many of common applications and operating systems used in this one-to-many delivery model.

Cloud computing technology is still relatively young in terms of maturity and adoption. The expectation is that it will undergo several changes in the future, in terms of resources, issues, risks and ultimately best practices and standards. Students create their own "*Cloud-Based Personalized Learning Environment*" or use m-learning and access to Open Educational Resources form the cloud. However, there are some sort of advantages that cloud computing can potentially provide such as value of quality for institutions of higher education and several other teacher educational institutions.

In this paper the author has tried to explore the salient features of the nature and educational potential of cloud computing in order to exploit the affordance of cloud computing in teaching and learning in higher education context. It is evident that cloud computing has a significant place in the higher education and is the process of transforming the landscape of higher education, both as everywhere computing tool and as a powerful platform.

Although the adoption of cloud computing promises various benefits to an institution, a successful implementation of cloud computing in an organization, particularly in educational institutes requires an understanding of different dynamics and expertise in different domains. The approaches outlines in this paper, along with other strategies have already been applied successfully to a wide range of problems. Based on what has been deciphered so far, ongoing research efforts and the continuing advancements of computing and networking technology, it is believed that cloud computing is poised to have a major impact on our society's data centric commercial and scientific endeavours.

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