International Journal of Management, IT & Engineering
Vol. 7 Issue 7, July 2017,
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

CLOUD- A WAY TO UPLIFT TRADITIONAL TO TECHNOLOGICAL EDUCATION

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Abstract

Technology advancements have always had an important impact on development, affecting even the most important system of the country, the education system. Education plays an important role in maintaining the economic growth of any country. Now a days the classroom teaching is changing and students are attracted more towards technology. Therefore in this changing environment, cloud computing is one of the latest technologies which will help in better teaching and learning process among the students and teachers via internet. Three types of architecture had been made to access cloud computing services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). This technology helps in sharing the computational applications rather than having local servers and personal devices. Currently, every teacher in education has turned to cloud-based technologies in the classroom to enhance students in learning and be able to compete in the innovative economy. Actually, the word 'cloud' is used to refer to internet which has currently eased and revolutionized education. The term cloud-based technology refers to the act of storing and accessing information and various programs over the internet. This paper focuses on the upliftment of ICT enabled cloud based education system.

Keywords:
Cloud Computing;
Cloud services;
Vision;
School Education;
Higher Education.

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1. Introduction

Over the last few years, Cloud computing technology is an emerging force in development of education sector. Educational institutions all over the world have already adopted the cloud for their innovation [1]. The benefits of cloud computing are being recognized in almost all kinds of institutions across the globe. Almost 90 percent of organizations currently using some kind of cloud based applications in their respective fields.

Now we are in technological development age of 21st century, so all educational organizations such as colleges and universities along with schools are now trying to adopt cloud based education system. As per the Indian context, we could say that cloud technology has already shown his presence in education. Top most colleges of India have already started various cloud based apps for delivering various services to their students. Also, different online programs have been started by universities for their students through cloud technology.

In addition to this, students and teachers access many applications and services in the cloud, which can be used in formal and informal education free of charge [2]. 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 or virtual communities of learning and teaching.

2. Present Scenario

At Present, ICT in Indian education sectors limited to class rooms or labs of private/government organizations. As per the survey [**13]** 80% of teaching in India is done through traditional methods or tools. For improving the education services in India government has taken the serious steps towards the development of basic infrastructure. Therefore, by improved infrastructure, use of Cloud computing in education sector has to be promoted as it offers infrastructure, softwares and platforms at lower costs. Cloud computing offers services like student information system etc. The SaaS model of cloud could enables the use of school management softwares at low costs, presently these softwares requires a very high license fees. Various research departments could be benefited by implementation of cloud in their respective departments as sharing of data/information could be done easily. Using of Private cloud in confidential departments like exam etc. at university/college level could help in secure access of that data through web

browsers. Getting of the low cost infrastructure at school or college level through IaaS layer of a cloud also helps in encouraging the use of cloud computing in education sector in India**.[14]**

Recently, Government of Bihar has launched free Wi-Fi services in the campuses of 16 universities along their 273 colleges and 16 higher educational institutions. Almost in all colleges and universities, infrastructure has been installed but till now it could not reached to its effective level due to lack of technical or supporting staff in maximum colleges to aware the usage of Wi-Fi facility among students. In this context, colleges came under urban areas availing facility much better than rural counterpart. This project is a part of ICT by which students teaching and non teaching staffs of universities and colleges access through cloud based technology in their academic as well as administrative activities.

3. Cloud Computing

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as a model for providing a provisioned and on-demand computing resources which includes networks, servers, storage, applications, and services. It can be accessed using the Internet and needs minimal management effort or interaction from the cloud service provider (CSP**).[3]** Cloud computing is delivered at levels offering software applications, application platforms or various infrastructure elements as cloud systems. According to NIST cloud computing has three service models:-

1) Software as a Service (SaaS): the entire system is cloud based, so users are presented with the application(s)only. E.g. - Google Apps, Zoho Office.

2) Platform as a Service (PaaS): suitable for user intending to deploy their own applications. E.g. - Google App Engine.

3) Infrastructure as a Service (IaaS): provides cloud based infrastructure such as storage, processing and networking elements. E.g. - Amazon EC2 and S3.

Cloud computing is usually deployed in three models:

Public cloud

Public cloud or external cloud describes cloud computing in the traditional mainstream. Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. A public cloud provides services to multiple customers.

Hybrid cloud:

Hybrid clouds combine both public and private cloud models. This is most often seen with the use of storage clouds to support Web 2.0 applications.

Private cloud:

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service. The company owns the infrastructure and has control over how applications are deployed on it. Private clouds can be built and managed by a company's own IT organization or by a cloud provider. **[12]**

4. Working of Cloud Computing

Cloud computing system can be divided it into two sections: the front end and the back end. They connect to each other through a network, usually the Internet. The front end side is the computer user, or client. The back end is the "cloud" section of the system. On the back end there are various computers, servers and data storage systems that create the "cloud" of computing services. A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It follows a set of rules called protocols Servers and remote computers do most of the work and store the data.

5. Vision Of India.

As per the India Vision 2020 document "Literacy must be considered the minimum right and requirement of every Indian citizen. Presently, the country has about 300 million illiterate adults. The Government's goal is to achieve 75 per cent literacy within the next five years."

The key challenges facing the educational sector today are quality of education and reach of educational services to remote corners of the country**.[4].** As per the India Vision 2020 document, "the current enrolment rate for primary education is around 77 percent and for secondary education about 60 percent". Further, "increasing enrolment to cover the entire school age population needs to be combined with efforts to increase the quality and relevance of school curriculum to equip students with not only academic knowledge, but also values and life-knowledge. Concentrated efforts are needed to tap the potentials of alternative methods of

knowledge delivery for both school going and non-school going children and adults, including television, computerised self-learning and Internet-based courses."

The NTP (National Telecom Policy)-2012 envisages that, The Cloud offers quality education by low cost implementation of IT tools leading to qualitative improvement in educational content and delivery and by enabling remote education. [5]. Since, the Cloud eliminates the costs of procuring and maintaining IT infrastructure, the educational sector can now embrace software tools for smoother operations and improving the quality of educational content. Educational institutions are also in a position to take advantage of certain SaaS based software which has been made available for free or subsidized cost to the education sector.

According to the India Vision 2020, there are a "huge number of young students that will quest for all levels of higher education and a severe shortage of qualified instructors" **[3].**The vision further highlights that "the country should embark on a massive program to convert progressively the higher educational curriculum into a multi-media, web-based format and to establish accredited standards for recognition of courses taught under distance education programs". There have been some initiatives to harness the internet in the area of higher education through NPTEL (National Programme on Technology Enhance learning) by joint initiative by IITs and IISc, which broadcasts regular classroom lectures in engineering, science and humanities streams on the web. Such initiatives are precursors and can be extended further by providing dedicated remote classroom sessions using the Cloud. Further, National Telecom Policy, 2017 is also working on high speed broad band network to broadcast remote class room sessions at high speed on cloud.

6. Cloud in School Education

In this modernized generation, learning in schools and institutions also advance with the advanced technology. Unlike the past generation where one had to attend classes with piles of books everywhere, currently things have changed especially with the introduction of e-learning where you can access your syllabus via internet. It only requires you to be computer literate which in this new generation is amongst the easiest things and most common things to know, and then everything else will flow. We all understand the great impact these new technology has had

on the field of business, homes and entertainment. But think of its impact on education. Currently, every instructor in education has turned to cloud-based technologies in the classroom to enhance students in learning and be able to compete in the innovative economy. Actually, the word 'cloud' here has been used to refer to internet which has currently eased and revolutionized education. The term cloud-based technologies refers to the act of storing and accessing information and various programs over the internet instead of accessing it or keeping it in the computer hard drive. With this technology teachers and students are able to interact and get connected through internet-based portals and get the latest and updated information as they stream online. Examples of some of the classroom settings where cloud-based technologies are utilized include:**[13]**

The following figure 1 shows how the School Education System can use the Cloud Computing:

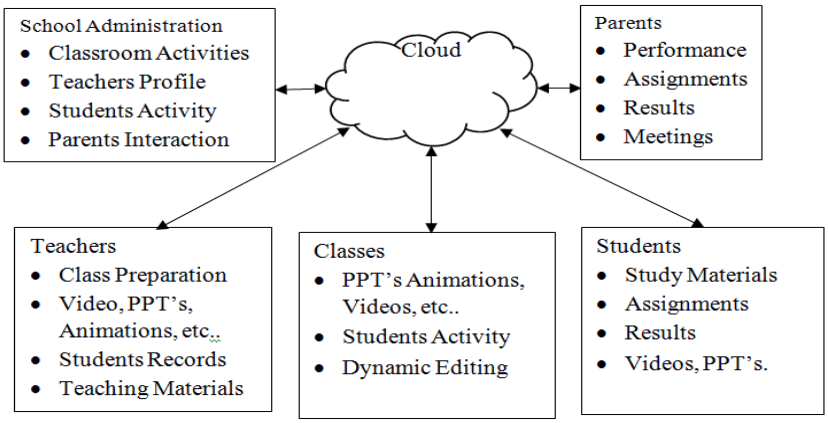

Fig. 1 School Education System using Cloud Computing.**[1]**

Cloud-classrooms

Students in a particular class room are able to connect with other students in another class room from a different locality and communicate well without problems and create so-called "cloud-classroom". Students with the help of webcams can share different ideas online. For example, a number of students have learn various foreign languages and customs online. Do you know that there are students who even take their exams via internet?

Educational technology in classroom

In most advanced and developed schools with cloud-based technologies in the classroom, you will find for example installed touch-sensitive smart boards, with stylus style pens that are specialized to write and draw on these smart touch sensitive boards. These smart boards actually have replaced the traditional white boards that used marker pens and frequent rubbings and writings. Technology has hit the education field with a boom for example students can participate in class discussion and cheering are modified with sound effects. Teachers are able to customize their teachings on a mobile device such as iphone and display them on these touch-sensitive boards.

Lecturing

With the technology, teachers are able to create interactive teaching. Students can visit the customized website which is normally free and get their lessons thus they can also interact with their teachers from the comfort of their homes without visiting their class rooms.

Group projects

Unlike the past days where students could gather together for the sake of completing certain assigned group projects, with cloud-based technologies, they are able to complete the projects by interacting with their group members online and submit the results online from their homes hence making the process easy and quick.Generally, using cloud-based technologies, teacher and students are able to access software and data from a multitude of devices. They can then as well use these generally free technologies to ease the partnership together with engagement in face-to-face, online, and blended courses.Since this technology involves using a network of isolated servers that are hosted in the internet, it comprises of a number of advantages useful both to the teachers and the students. Below are some of the benefits of this technology.

Storage

Sincerely, the cloud or rather the internet is always a mass storage where one can store numerous information such as documents, photos, eBooks, and music among other things hence access them instantly whenever they need them without any traffic delays.

Accessibility

One aspect you need to understand is that any form of data that has been stored in the internet can easily be accessed from any device provided it can connect to the cloud. With devices such as smart phones, tablets, and laptops you can easily get your data contents from the cloud.

Safety back up

Normally, no one has the capability of destroying the data in the cloud. Usually, it automatically saves contents and when required you will get them even if your device crashes.

Saves time and resources

With this technology, there is no need of writing on boards or books lengthy assignments as you can access everything online. This on the other hand saves time as you will possibly get your assignment and do it online.

Some of the cloud services used in school are:

a. Sliderocket http://www.sliderocket.com/ which students can build and submit their presentations online;

b. Sidevibe http://www.sidevibe.com/ which allows teachers to create an interactive lesson on top of an existing web page and also collect and assess students' assignment right away;

c. Jetjaw http://www.jetjaw.com/ that enables student to participate in exams displaying their results instantaneously on the screen;

d. Ratatype http://www.ratatype.com/ typing lessons that helps students learn how to type faster and pass typing tests online http://www.ratatype.com/typing-test/ ;

e. iCyte http://www.icyte.com/ that allows in the capture of pdfs and web pages.

7. Cloud in Higher Education

Universities are facing difficulties to provide scalable and flexible IT services. For instance, in traditional computer labs, there are many challenges present such as, limitation of lab hours and seats during the peak hours, repairing and maintaining computer labs, traveling to and from university, cost of outfitting traditional computer lab (hardware and software). Normally, IT

services required by students, researchers and academic are requested from the IT Department, whose job is illustrated in Figure 2.

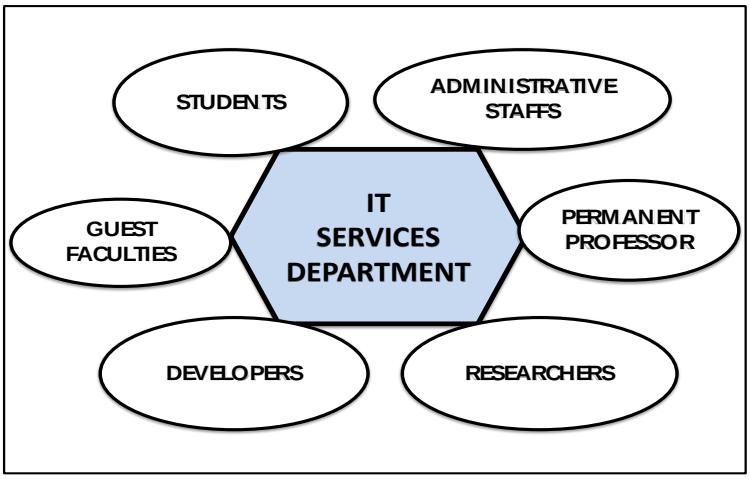

Fig-2 Users of IT Service in University Departments

The IT department provides Students, Staff, Guest Faculties, Permanent Professors and Researchers with different software and hardware tools. However, in cloud computing all these arrangements can be migrated to the cloud.[7]. Figure 3 illustrates an example of how cloud computing is used in the university.

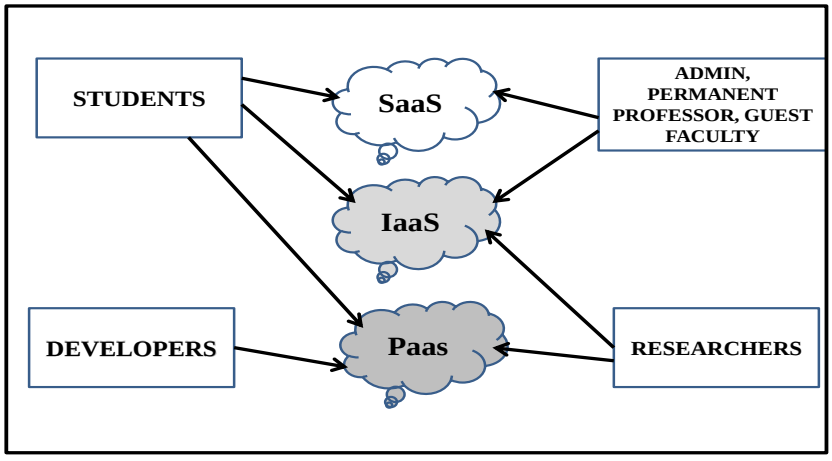

Figure 3: Cloud computing service models in a University

Cloud Computing offers services that enable the universities to concentrate more on teaching and research activities rather than building on complex IT configurations and software systems**.[6].** It can also be deployed more quickly. Complexity can be reduced with Cloud Computing. Students can exploit different learning tools. Students already use some, such as Google Docs and Office365 and Windows Azure Platform for computer science students. **[8]** Students can access the learning resources they need from anywhere and at any time with any Internet capable device.

Lecturers may experience flexible benefits as the cloud provides an easier platform to prepare their teaching portfolio presentations, lessons, conferences, articles, etc. Researchers may also benefit from the advantages of using the latest technologies and hardware to do their experiments, while paying for using these services only on demand **[8].**

Developers can design, build and test applications on the infrastructure of the cloud service provider and produce those applications from cloud provider data centres to the end user. **[6], [9].** System administrators can leverage processing, storage, database management and other resources available on the cloud.

8. Cloud Services

Educational cloud has been adopted by many IT Companies. Microsoft, Google, Amazon and IBM have provided much initiative to support education institutions with the necessary learning tools. Some of these initiatives are free with no cost. Table1 shows some of the existing educational clouds and tools.

Table 1 Examples of educational cloud-based applications

S.No.	Commercial Product Name	Educational Cloud Apps	Features
1	Microsoft Education Cloud	Microsoft Live@edu	Website Creation, File sharing, Word processing, Desktop sharing, Resource scheduling

2	Google Education Cloud	Google Apps Education (GAE)	Google Mail, Google Sites, Google Docs, Google Video, Google Calendar, Google Talk
3	Earth Browser	Earth Browser	Provide real time data for weather, geological and other data
4	Socratica	Socratica	Classrooms in science to access, create and study modules
5	VMWare	Virtual Desktop	Provide Virtual computers
6	IBM Cloud Academy	Virtual computing lab	Smart analytics system

With the availability of content online, it is unnecessarily for lecturers to print teaching materials. Nowadays, students have the choice to access homework assignments, lesson notes, and other materials online with the cloud. Some of the leading cloud services in higher education are described below.

Microsoft Education Cloud

Microsoft Education Cloud has been actively developing educational cloud services such as Microsoft Office 365. It provides schools with free email, website with editing and storage facility, instant messaging, web conferencing, and 25 GB of personal storage **[10].** Furthermore, students and faculty are able to use any browser to create documents using Microsoft Office **[11].** The downside to Microsoft 365 is the cost. While a free option is available (with a signed contract), a per user monthly payment is required to access features such as Office Mobile, Office applications for PC or Mac, unlimited email storage and voicemail. More alarming is Microsoft's inability to ensure 99.9% uptime without monthly payment **[10]**

Google Education Cloud

Google Apps for Education is one of the most used application as it does not involve actual cost **[10].** It is free with no hidden costs. Some of the feature include cloud email, 30GB of storage,

hosting, word processing and collaboration tools(Google, 2015). Google is Microsoft's strongest competitor. If it is compared to Microsoft's Office Suite, there is an existing familiarity with many of Google's products such as Gmail, Chat, and Calendar. Nevertheless, the main drawback is that it requires users to have (or create) a Google account. It is compulsory for user of age 13 years old and below to get parent consent

Earth Browser

Earth Browser is a virtual globe software developed by Lunar software. It is available online as a flash application or be installed locally as an application (Earth Browser, 2015a). It focuses mainly on visualising geophysical information such as weather, earthquakes, etc. It shows the earth as satellite images. Earth Browser can be used in real-time. It is shows the object in three dimensional model with continuously updates information(Earth Browser, 2015b). The representation of the earth is rendered along with a large data which is said to be accurate. The object can also be rotated and zoomed to a given distance.

Socratica

Socratica produces high-quality educational videos for people of all ages(Socratica, 2015). The videos developed are high-definition, clear, concise, and beautiful. Socratica collects and organizes the best free educational videos into topics that can be used by users. Socratica's mission is to organise educational videos. This can be used by users to create optimised learning experience. They have also restricted videos suitable for age groups by having different channels in YouTube.

Virtual Desktops

In computing, a virtual desktop is known as another user interface that is able to provide user with the virtual space of a computer's desktop environment through the use of a software application installed in a user's physical computer. (VMware, 2015) Generally, there are two ways to expand the virtual area of the screen. The virtual desktop are switchable allowing user to create virtual copies of their desktop that is switchable. This can be done with open windows existing one desktops.

Another approach can expand the size of one virtual screen more than the physical viewing device. Usually, navigating an oversized virtual desktop is viewed using scrolling/panning into the subsection of the virtual desktop. One of the most popular VMware product is VMware Horizon 6. It provides a virtual desktop infrastructure (VDI) platform that provides virtualized and remote desktops and applications system through one platform, enabling users access to their online resources through one integrated workspace (VMware, 2015)

IBM cloud academy

IBM cloud academy is a collaborative community of leaders in education. It is intended for educational institutions, with a goal to help reduce costs and optimise services while making information available, and secure if needed (IBM, 2014). It can also be used to consolidate resources, improve student success, and accelerate scientific discoveries. On the management part, it is expected to add administrative efficiencies, and conserve resources. These are known as how cloud can help educational institutions to provide services. They are actively integrating cloud technologies into their infrastructures to share best practices in the use of clouds and to collaborate with partners to create innovative cloud technologies and models.

9. Conclusions

Cloud based education still in its growth and development stage. The adoption of cloud computing may help universities, colleges and schools to focus more on their main goals which are related to teaching and learning at minimum cost. Both students and staffs can rapidly access various applications and pool of resources on-demand. In this paper researcher tried to describe how School, Colleges and universities are being using Cloud in their daily educational activities. Also, explains the services offered on cloud by different organizations for students and academicians through their websites at minimal cost or free service. Focuses also on the Bihar government initiative on free Wi-Fi services in all the universities and colleges of Bihar for accessing large pool of data via cloud through network service providers for students.

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