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A RESEARCH PAPER ON "A STUDY ON THE SCOPE OF CLOUD COMPUTING IN MANAGEMENT EDUCATION"

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Abstract: The cloud computing is a rapidly developing technology, which has brought significant changes and opportunities to various sector in India. It is a pervasive computing paradigm that has revolutionized how Information Technology infrastructure and services can be delivered. There is a growing interest around the utilisation of cloud computing in the education sector. Present study is an attempt to provide an overview of the cloud computing model and its applications for collaboration between academia and student.In this paper we proposed cloud computing to e-learning from the following aspects: its work mode, services, benefits and issues.This paper is an analytical study on the role of cloud computing in education with reference to management institutions. Primary study was carried out with major stakeholders oftechnical education infrastructures which are implemented for academic use. The state of the art on the use and research of cloud computing in education was conducted viaqualitative methodology. After a comprehensive analysis of the available literature, approx. 8 research works have been identified and discussed to highlight the importance and probable usage of cloud in the education domain. The survey identifies and analyses the advantages and risks that the use of cloud computing may have for the main stakeholders in education. The extensive analysis suggests that the introduction of cloud computing to management education is feasible to bring greater clarity landscape about its benefits.

Keywords: Cloud Computing, Cloud Computing& Learning as a Service (LaaS), Software as a Service (SaaS), Virtual Computing Lab (VCL), Distributed learning environments, Interactive learning environments

INTRODUCTION

In recent years e-learning tools appear to be growing and are becoming widely accepted as a learning method (Ewuzie & Usoro, 2012). In the last couple of years "cloud computing" has increasingly been discussed in the various forums (Krelja Kurelovic, E., Rako, S., & Tomljanovic, J., 2013). Cloud computing is not a completely new concept but a combination of new and existing technologies. The cloud computing is also a disruptive and evolving technology, which brings computing power, large storage, applications and services to user via Internet.This new computing trend focuses on users requirements, and also driven by the increasing use of various mobile devices such as Laptops, Tablets and Smartphone's.

The cloud computing has many advantages with some limitations, both arising from the fact that all data and applications are located on the Internet. Since the data stored and applications on cloud can be access real time and online.It can be used in various activities of everyday life, including in education. Cloud computing is a model for enabling convenient, on-demand network access to the shared pool of resources (e.g. servers, storage, applications and services), which can be rapidly provisioned and released with minimal management efforts. As per the cloud model adapted and the usage of it are the basis for chargeable commercial value.
For formal and informal education, many applications and services on the cloud the access can be provided to students and teachers. The cloud computing allows for greater flexibility and mobility in the use of resources for teaching and learning with greater degree of collaboration, communication and sharing of resources. It also creates a personalized learning environment or virtual communities of teaching and learning.

REVIEW OF CLOUD SERVICE MODELS

The cloud computing has major deployment models such as Private, Public and Hybrid, but has a different characteristics such as Client-Server Model, Grid Computing, Fog Computing, peer-to-peer computing. All the cloud deployment models offer different services such as Infrastructure as a service (IaaS), Platform as a service (PaaS) and Software as a service (SaaS) (Alshuwaier & Areshe, 2012).

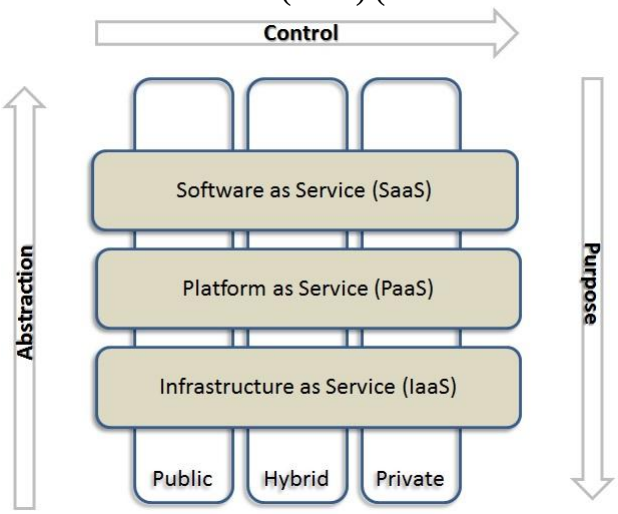

Figure 1: Cloud Service Models

Infrastructure as a Service (**IaaS**): In this cloud service model the service provider hosts all the required necessary hardware and the Internet connectivity link. The useronly share responsibility for the virtual machine hosted on this hardware and the software's(include operating system) which runs on it. As shown in figure 1, this is the last / bottom layer and the software applications run on it. This service provides on demand infrastructure which is storage, computing, networking, management and support components (virtual servers). This infrastructure is accessed via Internet, enabling organisations to move their data to cloud. Resulting in to dissolve or dismantling there in house data centers. Each of these services can be deployed by organizations or individuals either as a private, public, hybrid and community cloud.

Platform as a Service (**PaaS**): In this cloud service model the user supplies the application they wish to deploy, and the cloud service provider supplies all the components required to run this application which is also called as application hosting. As shown in the figure 1, this is the middle layer between SaaS and IaaS. It provides operating systems and application development platform which can be accessed and utilized via the Internet. Developers use this platform to develop, test, deploy and host web applications as a service via the internet. E.g. providers of such platforms as a service are Google Application Engine, Microsoft Windows Azure and International Business Machine (IBM).

Software as a Service (**SaaS**): In this cloud service model the service provider supplies the software application and all the components required for its execution. SaaS is designed to be a turnkey solution for the customers. Many web-ERP software solutions are hosted on the SaaS cloud and provide accounting and business Information to the user or customer. As shown in the figure 1, this is the top-most layer of cloud computing. This layer involves applications such as text processors, video editors and databases to be hosted by cloud service provider and is made readily available to the users on demand via Internet. Few examples of software as a service includes customer relation management (CRM), email messaging, Google Document (Doc) etc. (Alshuwaier, Alshwaier, & Areshey, 2012)

Community cloud: It is exclusively for a set of users within closed group having a common goal.

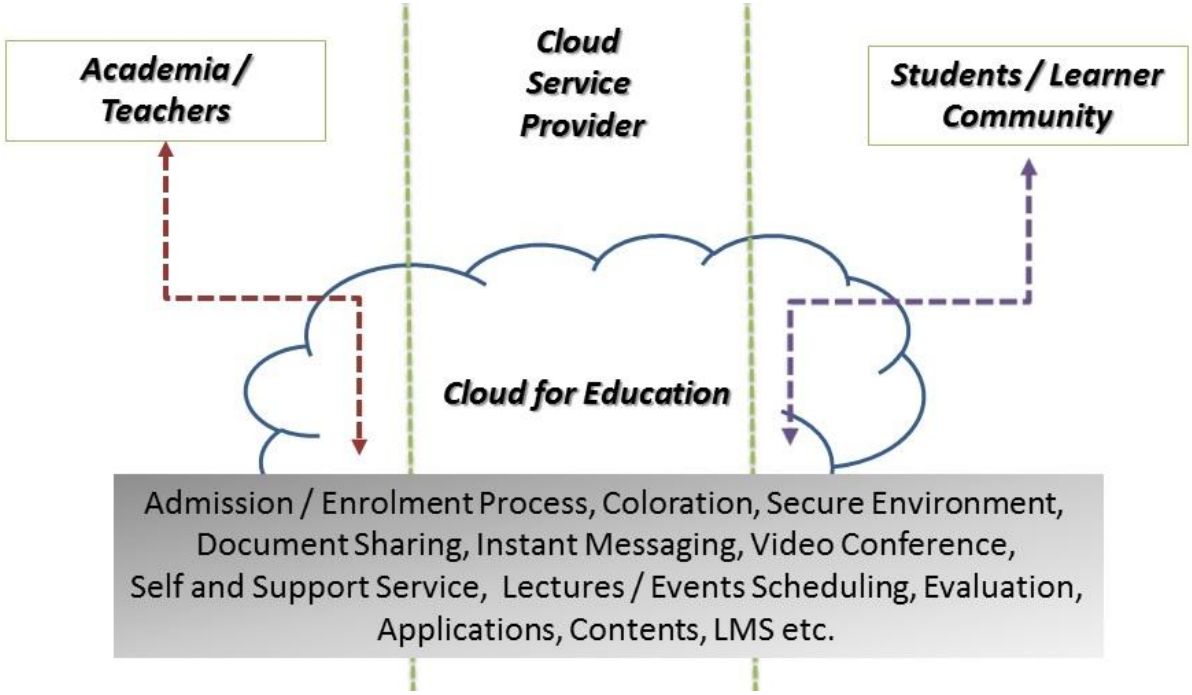

Figure 2:Cloud for education

Many Universities / Institutes offer complete online education programs using hybrid cloud model. These Universities / Institutes implement cloud-based solutions for their IT infrastructure. The main use of cloud-sourcing is for E-mail, calendaring, collaboration, videoconferencing, ERP (enterprise resource planning) and learning

management systems. Outsourcing the provision of learning management solutions (LMSs) such as Blackboard or Moodle to a third party makes sense for institutions to who cannot justify the costs of purchasing, maintaining and supporting the hardware and software themselves. Such LMSs solution provides collaboration between academia and students. The e-learning can't totally supplant educators; it is just a redesigning for innovation, ideas and instruments, giving new substance, ideas and techniques for instruction, so the parts of instructors can't be supplanted (Ishaq & Brohi, 2015).

ROLE OF CLOUD IN EDUCATION

The administrator, a teacher, a student, or the parents, now have a great time to explore how cloud-based applications can benefit Students and Institute or University (Kaur & Singh, 2015).

Benefits	Description
Less expensive or subscription based textbooks	The post graduate level textbooks are expensive and have less number of copies in library. Cloud-based textbooks can solve this problem by converting them in to digital content format, which are less expensive than printed. This will help the lower-income group students to have access to quality learning materials.
No more outdated learning materials	Many times, the expensive printed textbooks which students are using from library are outdated. Also due to financial concerns or budget provisions, replacement of these outdated resources becomes an issue. In Cloud-based materials are easy to update on real time basis, so that students get access to the latest learning resources.
Less hardware expenses	Cloud-based applications runs on Internet browsers and they are also compatible with the mobile devices. This means that learner does not necessarily need to own an expensive computers / laptop, a Smartphone or Tablet can access these applications. Learner doesn’t need to buy any storage devices, as the data can be stored on to cloud like Google Drive.
No expensive software required	One of the biggest advantages of cloud computing is the SaaS model (software-as-a-service). Many software applicationsbased on Android based devices are now available either free or on a low-cost subscription basis.
Students reach	Cloud computing has opened a world of new possibilities for learner and academia. Now the learner can earn their diploma via opting online instruction medium. There are many other types of students for whom a traditional school environment simply doesn’t work, and cloud computing has provided alternate to these students.
Environment	Cloud computing not only reduce costs, but also create an environment where all learner have access to high-quality education resources. Such online cloud based environment creates collaboration amongst academia and student or learner.

But since the Internet is a public media or network with little regulation, it also leads to some issues. But as more and more information is being placed on the cloud, concerns are beginning to grow about just how safe an environment it is? (Viswanath, MD, Kusuma & Gupta, 2012)

Issue	Description
Security	The customer argument that the data is more secure when managed internally on local hard-disk or LAN storage. Also the location of data storage is unknown in the cloud environment.
Privacy	Unlike traditional computing model, the cloud computing utilizes the virtual computingtechnology where user data may be scattered at various virtual data centers, which might be located geographically at different location. Where there could be controversy in data privacy protection in the locational legal systems.
Reliability	In cloud computing servers alsoexperience downtimes and slowdowns and users have a higher or complete dependent oncloud service provider (CSP).
CSP Locked-in	In the CSP's service model, once the selection of a particular CSP is done, the data is uploaded on to CSPs Infrastructure. Which brings locked-in, thus bring a potential business risk.
Attacks, Hacking, Theft	Hackers can invade virtually in to any server, and the statistics show that one-third of breaches result from stolen or lost devices. The other reason is from employees' accidentally exposing data on the Internet. Attackers have ability to analyze the critical task submitted by the users on the cloud.
Open Standard and APIs	The open standards are critical to the growth ofcloud computing. Most cloud service providers expose APIswhich are unique totheir implementations and are not interoperable.
Compliance	The regulations to the storageand use of the data require regular reporting and audittrails, cloud service providers must enable their customers tocomply with these regulations.In addition the data centers maintained bythe cloud service providers are also be the subject to compliancerequirements.
Long-term Viability	User should develop some mechanism to ensure that the data they put intothe cloud will never become invalid even if cloudprovider shuts or get acquired by other company.

SOLUTION

As the advancement in cloud computing, the user communitymust take proactive measures to ensure security by the data encryption. Also need to check CSP vendor'sreadiness forsecurity certifications and external audits, identitymanagement, access control, reporting of securityincidents, personnel. The user community need to send and store minimize personal information in the cloud. Cloud Service Provider should enable and maximize the user control andprovide feedback.

DATA ANALYSIS AND INTERPRATATION

The data collected for this research were from both primary and secondary sources. The primary source data were collected using questionnaires, while the secondary

source data were gathered from academic Journals, publications, the Internet and literature based on cloud computing (Awosan, 2014).

Questionnaires: The questionnaires were distributed using Google docs, anonline survey application because this allowed for easyadministration of questionnaire. It allows for easier statistical analysis. (Gupta, N., & Thakur, S., 2014). The questionnaire link was emailed to respondents and was introduce to the subject in a personal meeting with them.

Secondary Data: The secondary data used for this research was obtained from academic journals, Google scholar search engines etc. Also, many useful publications from internet were used. The data from these resources were useful in developing the literature review, the research objectives and research plan.

The data analysis was performed on the responses given by 53 respondents from Graduate Degree Colleges, Post Graduate Institutes and University Study Centres.

Table 1: Type of organisation

Experience	Degree College	Post-Graduate Institutes	University (Distance Mode)
Organisation type offers management education	28 (52.8%)	20 (37.7%)	5 (9.4%)

Table 2: Media of study material distribution to students

Media	Count	%
Text Books, Printed Notes	21	51.9%
eBooks	28	53.8%
CDs	12	23.1%
Depends on Teacher / Faculty	48	92.3%
None	5	9.6%

Table 3: Mode for course / subject lecture delivery

Course Delivery Mode	Count	%
Personal Contact Programs (Periodic in year)	5	9.4%
Virtual Class Rooms / Video Conference	17	32.1%
Course based Video Lectures	7	13.2%
Traditional Class Room Teaching	49	92.5%
None	2	3.8%

Table 4: Awareness of Internet / cloud computing

Experience	Not aware	Somewhat aware	Totally aware
Awareness of Internet / Cloud Computing	8 (15.09%)	39 (73.58%)	6 (11.32%)

Table 5: Website for content delivery

Website Hosting Mode	Count	%
In-House	1	1.9%

Out-Sourced	12	22.6%
Web-sites (No knowledge about hosting location)	24	45.3%
No	16	30.2%

Table 6: What Cloud / Internet based services your Institute has adopted?

Internet / Cloud based services	Count	%
CRM, ERP, any Web Application	9	17.0%
Web based email like gmail, hotmail etc.	51	96.2%
Google Docs / Groups (Students Collaboration)	29	54.7%
Video Dictionary of Lectures	6	11.3%
Storage for Data Sharing	24	45.3%
Online Library for ebooks, article, white papers	12	22.6%

Table 7: Will cloud computing play major role in the collaboration at your Institute?

Role of Cloud Computing	Count	%
Yes	21	39.6%
No	3	5.7%
Never thought about it	23	43.4%
Neutral	6	11.3%

Table 8: Do you find cloud computing is insecure medium / environment(Trust Factor)

Cloud Computing insecure Medium / Environment	Count	%
Strongly Agree	0	0%
Somewhat Agree	32	60.4%
Disagree	1	1.9%
Neutral	20	37.7%

Table 9: factor might affect the adoption of cloud computing

Factor affect the adoption of Cloud Computing	Count	%
Internet Bandwidth	19	35.8%
Staff Motivation	24	45.3%
Budgets, College / Institute Policy	21	39.6%
Vendor Support	11	20.8%
Neutral	23	43.4%

Table 10: factor affects the adoption of cloud computing in education

Factor affect the adoption of Cloud Computing in Education	Count	%
Security, Privacy, Reliability issue	23	43.4%
Hacking, Theft, Attacks	14	26.4%
Content Development	23	43.4%
Laws and Regulation	0	0%
Neutral	25	47.2%

LIMITATION: Although the research has reached its aims, but there are some limitations. This research was conducted on a small size of population in Mumbai-Thane region.We have gathered statics about the subject from the University,

Institutes and Degree College's who offers management education.For the data gathering the qualitative questionnaire were filled by the officials from the respected institute's offers management education.

CONCLUSION:

The cloud computing is a rapidly developing Internet-based computing model. With the combination of e-learning using cloud computing and management education, opens up new ideas for further development. This paper we have discussed a cloud computing based eLearning, benefits & issues. There is no doubt that the introduction of cloud computing into management education is feasible & brings us the approximately infinite computing capability, scalability, benefits to the students. The paper also highlights the usage of cloud is not adequate in the degree level colleges, which needs to be improved.53% of the institutions provide eBooks, which is an advantage for students and changing environment. The 92% of the institutions uses traditional class room teaching method and also used video conference for lecture delivery. 73% of the institute officials are totally aware of Internet and cloud computing technologies. 70% of the responding institutes have college website, but do not have any mechanism for study material or content delivery. 100% of the responding institutes use email for collaboration with regulators, students and other stake holders. 40% of the responding institutes believe that cloud computing will play major role in the organisation for collaboration. From security aspect 60% of the responding institutes believe that cloud is somewhat insecure. 45% of the responding institutes believe that staff motivation will affect their cloud adoption for management education. Majority of the responding institutes believe that security, privacy, reliability, hacking, theft, attacks would be the major factor which will affect overall cloud adoption.

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