The Emerging Role Of Cloud ComputingIn AcademicSector– Bringing Innovation In Education

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Abstract : The emergence of Cloud Computing and its constituent tools and technologies have found profound relevance and are the prime force of success in any business sector. The adaption and operations of Cloud Computing technologies in the educational sector is still at a slower pace in comparison to others. The paper aims to highlight the importance of applying Cloud Computing technologies to various aspects of the education sector and primarily focuses on three specific target users namely students, teachers and the organization as a whole.

Over the years, the education industry has come a long way. Teaching and learning are no longer confined to textbooks and classrooms and now reaches computers and mobile devices. Today, learners are always connected — whether they are on or off school grounds. At the same time, the right technologies like cloud computing empower them with real-world and career- ready skills. Technology plays a massive role in this disruptive change.

I. INTRODUCTION

Internet has been a driving force towards the various technologies that have been developed since its inception. Arguably, one of the most discussed among all of them is Cloud Computing. Over the last few years, cloud computing paradigm has witnessed an enormous shift towards its adoption and it has become a trend in the information technology space as it promises significant cost reductions and new business potential to its users and providers. The advantages of using cloud computing include:

i) Reduced hardware and maintenance cost

ii) Accessibility around the globe

iii) Flexibility and highly automated processes wherein the customer need not worry about mundane concerns like software up-gradation.

Higher and professional education is a domain which constantly needs to be evaluated and transformed to follow the fast pace of changing trends in different sectors in the market which in turn creates a variety of needs in workforce. A major factor that has radically altered the way education is conducted is technology. Examples of different types of technologies used in education are mobile devices and apparatuses, teleconference and remote access systems, educational platforms and services and other that students, teachers, academic faculty, evaluation specialists, researchers and decision- makers in education interact with and use in an effort to impact and improve teaching and learning but also to realistically reflect in the learning stage the usage of modern technologies used in real settings.

The interaction with these technologies generates large amounts of data that range from an individual access log file to an institutional level activity. Still the educational systems are not yet fully prepared to cope with and exploit them for continuous quality improvement purposes. In particularly, health professions education or health education is a context that these technologies are predominantly used, producing a wide range of educational data. In addition, health education is in constant need of reflecting the growing body of medical knowledge and evidence in order to practically embed it in education and prepare the future health professionals to meet the future challenges of healthcare systems. The need to govern these challenges within health education is now more than ever timely, and therefore, attention has been paid to different approaches such as Cloud Computing and analytics that could be useful in investigating and exploiting educational data too.

The innovation in technology combined with variety of data techniques have now provided the mechanism to deal with wide spectrum of issues that appear during the process of data collection and also during working with large volume, variety and velocity of data. The primary idea behind Cloud Computing is the application of information tools to pave way

fordataanalysisandextract useful information for better estimation, planning and judgment in any business process. Globalization has not only paved way for competition in world economics but has also driven educational reforms. Public expectations for accountability and transparency have immensely grown in every sector and education is no longer an exception.

Even though the education industry is continuously spawning large amounts of data, the application of Cloud Computing analytics is yet to gain momentum in comparison to sectors like Banking and Securities, Communication, Media and Services and so on. There certainly is a thriving enthusiasm in the education community to make use of Cloud Computing analytics to derive value which can be applied for the holistic betterment of the community.

Cloud Computing analytics can resolve all the issues of the education sector. Many foreign & private Universities for example adopted new data analytic tools to deliver solutions to the long pending problem of student retention. Various groups in the education sector look at the information collected in accordance to their own view and objective. Students, teachers and the educational institution itself can benefit by deriving values from the large volumes of data sets available. The paper is organized as follows –

Section II CloudComputing:HowDoesItBringInnovationinEducation? Section III Advantages & Applications of Cloud Computing For Education Section IV Suggestion, Recommendation & Conclusion
Section V References & Bibliography

II. Cloud computing: How does it bring innovation in education?

Cloud computing refers to a setup of computing resources that can be shared anywhere, irrespective of the location of the users. By implementing cloud computing, it becomes possible to bring teachers and learners together on a single, unified platform. Educational organizations such as schools, colleges, and universities need not buy, own, and maintain their own servers and data centers. Rather, they can leverage cloud computing to avail compute power, databases, storage, and other services when they need them. Additionally, they can always be sure about their resources being secure on the cloud. Let us elaborate on the extensive benefits of cloud computing in the field of education.

Strong virtual classroom environments

With cloud-based software, it becomes possible for educational organizations to have virtual classrooms for the students. The concept reduces the infrastructural costs to a considerable extent. They can even reduce the expenses of onboarding regular teachers in their faculty. Rather, they can collaborate with skilled trainers who work remotely and serve as cost-effective resources. At the same time, teachers can create and deliver online courses to students anywhere. Students can even appear for virtual exams, saving their time and expenses effectively.

Ease of accessibility

The potential of the cloud is unmatched when it comes to accessibility. Users can easily access the course content, applications, and data anytime and anywhere. They can enroll in courses and participate in group activities as well. The barriers of place and time no longer exist the cloud ensures seamless delivery of content at all times. What's more, it even sends across content on mobile devices so that students can easily learn even while on the go.

Extensive cost-savings

Another benefit of cloud computing that you cannot ignore is extensive cost savings. Both learners and providers can experience big benefits in this context. Students need not invest in expensive books and applications as these learning resources are available on the cloud. Providers too can lower the management costs by simplifying processes such as enrollment and assignment tracking. And of course, the infrastructural costs reduce too, as explained before. The best part about cloud computing is that you pay as you go, which makes it cost-effective.

Secure data storage

Besides accessibility and cost savings, cloud computing also serves the benefit of secure data storage. Organizations that

deliver learning through the cloud can adopt a VPN for ensuring data security. VPN protocols such as IKEv2 are responsible for the automatic encryption of outgoing data and traffic. This means that the learning content can be easily transferred to the users without compromising its integrity. At the same time, learners can protect their privacy by using VPN for cloud-based learning applications.

Scalability

Scalability refers to the ability of the applications to match the growing numbers of users. Cloud computing covers the schools, colleges, and universities on this front as well. It enables them to scale up the learning applications and experiences quickly and easily. As a result, they can handle an increasing number of students. Additionally, scalability also helps them to manage the usage peaks and traffic spikes caused due to events like training registrations and assignment submissions. Similarly, they can scale down instantly during the low activity period to prevent wastage of resources.

Agility and innovation

Another way learning providers can benefit from cloud computing is through agility and innovation. It gives them the ability to experiment faster and more frequently. Consequently, they can innovate to create better learning experiences for the students. This becomes possible because new tools and features can be developed, tested, and deployed in the applications to make them better than before.

Greater reach for the students

Cloud computing in the education industry brings the opportunity for the students to expand their horizons. Those who are not happy with the traditional learning systems can now explore the new concept of online education. This works wonders for students who want to opt for remote learning or even pursue courses overseas. Working professionals who are unable to attend conventional classes but want to upgrade their skills can also take virtual classes.

Minimal hardware requirements

With cloud-based applications, the requirements of hardware resources are minimal. These applications can operate seamlessly on internet browsers, both on desktops and mobile devices. Students can manage to learn with the mobile phone that they own. There is no need to invest in an expensive computer for taking the course. Additionally, they do not require external storage devices because they get access to free cloud-based storage. Learning could not get simpler than this!

III. Advantages of Cloud Computing For Education

Cloud computing offers an infrastructure, platform and educational services that create an affordable and innovative learning environment. Such an environment allows collaboration between all participants in the learning process and between different educational institutions that reflects on the quality of education

The benefits of the cloud computing model are for teachers and students as well as for the educational institutions. The advantages of cloud services for education can be considered from different aspects. The use of applications and services, delivered by external providers, is a cost-effective and efficient solution for educational institutions and allows enhancing financial flexibility. The advantages of cloud computing model, compared to the traditional approach, are expressed in: reduced costs for hardware and software as well as reduced costs for IT staff; payment for actual consumption; provision of many free services. Cloud computing offers a faster return of investments and dealing with rapidly changing software and hardware needs at a lower cost. There is a flexibility of the employment of resources combined with economic efficiency.

The educational institutions can implement effectively their strategy through cloud computing without the need to take care of its physical (hardware and software) provision. They have options to acquire and implement new IT solutions and to hire IT resources quickly. Service providers ensure the maintenance and management of IT resources. Cloud computing guarantees the use of modern ICT by educational organizations, something that cannot be achieved if they use their own IT infrastructure.

Cloud computing provides an easy and unrestricted access to services and resources at any time and place through a variety of devices both for teachers and students. The comprehensive accessibility by different devices enables the realization of ideas for mobile and lifelong learning – mobile learning that is expressed not only in using mobile devices, but primarily in the mobility of participants in the learning process.

Cloud Services with Applications in Education
Among the most popular cloud services that are successfully implemented in education are cloud-based office suites and storage services (cloud storage).

Cloud-Based Office Suites

Cloud-based office suites, also known as online office suites or cloud-based collaboration tools in real time, are office suites that are provided as SaaS services. Among the most popular cloud office suites, used in education, are Google Apps for Work, Office 365, Zoho Office Suite, Apple Productivity Apps, Amazon WorkDocs, Thinkfree Online, Live Documents. Cloud-based office suites are available through Web browser, so they are platform and hardware independent. There is no need to install and configure software on local computers that allows students and teachers to work with cloud-based office suites on a variety of devices, including mobile. Using cloud-based office suites the idea of BYOD (Bring Your Own Device) can be implemented.

Applications for creating and editing documents (Word processing, spreadsheets and presentations)

Some packages include applications for creating and editing graphical objects, database management systems, software for publishing content (applications for creating Web sites without requiring Web programming skills, content management system, Blog, Wiki, etc.). Availability of facilities for storing documents as templates is a premise for creating libraries (repositories) with reusable learning materials and accelerating and facilitating the process of developing new learning content.

Applications for communication – e-mail, instant messaging (IM), online conferences, forums, and others

They enrich the possibilities for communication (synchronous and asynchronous) between participants in the learning process and offer new and more engaging forms for active connection in real time. Options for adding comments to shared documents allow students to share ideas, seek help or advice in difficult tasks.

Calendars and tools for contacts management

Users can manage upcoming and ongoing events and meetings via calendars. Personal calendars enhance management of users' individual tasks. Shared calendars can support learning process and all activities taking place in educational institutions. They can be used for planning and notification ьфдкш different events and creating weekly, monthly or annual classes' schedules.

Shared calendars may help students organize collaborative work on group projects more effectively. On the other hand, teachers can use and share calendars with their colleagues to define schedules of meetings and events, educational activities and tasks with deadlines and support their timely execution. Some calendars (Microsoft 365) offer options for assigning tasks. Teachers can create and assign tasks to students and involve them to participate actively in both the academic and social life of the group.

Specific educational applications

Some vendors, such as Microsoft and Google, add special educational applications to their office suites, making them extremely popular among educational institutions.

Classroom

It is an educational application, part of Google Apps, which allows teachers to create, assign and collect students' individual assignments (9). Teachers create courses (classes) and make assignments for individual or group work. They can

add files from local computers, Google Drive, YouTube or a link to any Web page, since via Classroom there is integration between Google Docs, Google Drive and Gmail. Teachers can view tasks during the process of their performance, make comments, send feedback with recommendations or reviews to help students and evaluate them. Students can join classes, execute their assignments, communicate with teachers, comment and discuss with other students. Learners work on assignments directly in Google Docs and can add files from local computers, Google Drive or a link to a Web page or can create new Google Drive files of different types (documents, spreadsheets, presentations).

Suggestion, Recommendation & Conclusion

The paper depicts the importance of applications of Cloud Computing technologies to mine large educational data sets. Various scenarios pertaining to different target users namely students, teachers and educational institutions have been taken into account. Though Cloud Computing has unfolded its wings in various domains in an unprecedented manner, educational institutions are yet to utilize it to the maximum possible extent. Lack of computational capacities, tools and human resources can be attributed to this.

The benefits of cloud computing for the education sector are immense. It does not come as a surprise that major providers in the industry are fast embracing cloud tech so that they can enhance the services they deliver. Simultaneously, the cloud is emerging as the best option for the students as well. Nothing matches the convenience of accessing learning at the fingertips and cloud tech makes it possible. Whether it is a large university, a small school or a student, everyone in the industry is experiencing the positive impact of the cloud and things are going to get bigger and better in the future.

Cloud computing ensures comprehensive access to modern ICT for a wide range of users at any time and place via different devices, which is a prerequisite for the implementation of the ideas of lifelong learning. There is an effective use of available IT equipment with opportunities for renting powerful computing resources when they are needed. Using cloud services, educational institutions can concentrate on their main activities – training and research and fulfill them in the most efficient manner.

Cloud computing is extremely important and necessary for modern education. It transforms the role of ICT in training, supports and accelerates the processes of creating and providing an interactive learning environment where all participants have continuous access to diverse, high-quality educational resources and activities and work collaboratively.

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