# Cloud Computing In School Education: A Study Enlightening Benefits and Challenges

**Kishan Mali, Dr. Snehlata Kothari**

*Abstract*— **This study focuses on the benefits and challenges in school education and tends to achieve new paradigm by considering cloud computing. The advance learning and teaching methods in current education system over traditional education by adopting and implementing cloud computing technology and its impact factors. The study helps to understand learning and teaching in Govt. Schools, Private schools and other institutes of rural and urban areas. The findings of this study will acquire new paradigm and will be useful in forthcoming channel of education for the schools to plan for adopting new services in learning and teaching through cloud computing technology. There are so enough benefits of computer network facility but it seems very less use of one using computer facility. The schools of rural and urban areas have been taken for the research work and tried to highlight the gaps between traditional and modern learning and teaching.**

**In current scenario, Cloud computing has produced a greater impact in the education especially in rural areas of every state of India. In the education scenario 85% of the education system in India is covered by the rural sector. Rural Educational Institutions differ from their urban counterpart in the way that urban offers quality education with necessary infrastructure and abundant resources which lies most of the time underutilized. Providing the same standard of education to the rural as that of urban is not feasible due to the constraints such as cost, distance and expertise unwilling to travel to the rural. Hence, a method to overcome the above problem deploying the novel techniques in the field of education becomes vital. Our research is about providing support for improving the educational system in the rural area even when they are remotely located and geographically separated. The latest cloud computing technology is shared to the rural educational institutions at a reduced cost. The development in the field of cloud computing concepts like virtualization and SaaS proves help in sharing of educational resources at an affordable cost.**

**The educational institutions, schools, colleges, universities, administrators, teachers, and students would gain significant advantages from the new educational settings. The problems related to availability of infrastructure, software, hardware devices and their maintenance, electricity expenses and various other minor problems will be either overcome or can be reduced using Cloud technology. On the other part, the number of students is increasing willingly to get registered in schools, because students and parents have faith by seeing the hike in availability of the needed resources for betterment in education for mass number of students. Using cloud, education can produce a smart hands-on learning and teaching, and increasing the readiness of the students. Education system likely to allow teachers to better demonstrate the subjects' complexities to the students by renting needed facilities whenever it is desired. The study explores the effective learning and teaching in educational institutions.**

**This study produces a synthesis of information that guides classroom learning and teaching methods in the development and maintenance of the study of students with the advanced cloud technology and its features. The resulting analysis and interpretation provide a description of major themes that developed regarding strong teachers and students' behaviors' during learning and teaching, as well as, specific components to consideration for the student's learning environment. The study is totally focused on analysis and implementation of cloud computing technology based services in Government and Private Schools in Rural and Urban areas of Udaipur District, Rajasthan. The primary objective of study is to find out information regarding awareness and application of cloud computing services concerning to the learning and teaching at School education.**

**The success of the resource sharing in the targeted educational institutions was measured quantitatively and qualitatively across several dimensions. This makes the strong base to replicate this framework in rural and urban areas as well. As a conclusion to the study, more researches are required at the basic level of schooling to upgrade education system for future generation with initiating various programs at State and Central level by Indian Government for widely implementation of Cloud Computing in School and College Education System.**

*Index Terms*— **Cloud Computing, Learning, Teaching, Cloud Technology, Student, Teacher .**

## I. INTRODUCTION

Education plays a key role in managing financial growth, particularly for those countries which are under growing economy. To ensure high quality service regardless of the minimal resources available leaning institutions, both public and private can utilize the potential advantage of cloud computing. Different cloud-based applications are used by various learning institutions provided by the service providers. It ensures that their students and other users can perform both academic. Due to curriculum limitations, a lack of teacher expertise, and limited instructional computing resources many campuses do not offer courses in these important areas. Clouds provide an opportunity to scale learning environments. It also helps institutions needing an advanced curriculum.

In today's era, the word cloud computing is an ideal terminology in the world of information technology and has been adopted in various sectors as well as in education sector. The very best advantage of cloud computing are effective and understandable i.e. almost all cloud computing applications are decreasing the costing to institutions and IT, enabling collaboration, rising accessibility and offering educational

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field more adjustability in implementation their services in education system for students and teachers. Moreover, cloud computing has effective impacts as well as the highest possibilities to greatly improve education system, both in online courses and in traditional education during classrooms.

Today, teaching and learning uses more advance technology day in, day out so students have become more technologically savvy. There has been increasing pressure for educational institutions despite the looming financial crisis, to deliver better services using minimal resources. The parallel and distributed computing knowledge is important for students needing to address big data problems in later jobs in industry or academia. Cloud computing has continued to be adopted by more organizations due to virtualized resources through the Internet, as well as dynamic scalability.

To improve learning, the successful implementation of Information and Communication Technology can be very challenging. The literacy is best achieved in classrooms where the technology is an integral part of the educational environment. The increasing technology in the schools is advocated by number of folks. They seek their children to be technologically literate for successful career and making the Twenty-First Century a better tomorrow. Increasing technology in the schools is expected by so much of the general public supports for this reason. The technology is used as a daily tool for learning and solving real-world problems. It is dangerous to consider future trends not simply in terms of technological developments but also in teachers and learners skills and opportunity.

## II. LITERATURE REVIEW

There is almost a large area where researches and investigations have been done in education. Some of the published studies about the adoption of cloud model in educational sectors. However, very few studies have explored about cloud computing problems, challenges and implications while implementing cloud computing in educational sectors. Some studies related to adoption of cloud computing in education system at base level briefed below.

The article of *Kiran Yadav* explains the technology being adopted in education at school and higher level. According to the author, education has an important role to play in managing the economic growth of any country. In present scenario, classroom teaching has become more advanced and learners are getting used with and advanced education with technology. One of the latest technologies prevailing now days is Cloud Computing. When exchanging IT services in the cloud world, all educational institutions, learners and trainers can have highly advanced outsources and providing better concentrate to students, teacher, and staff in various ways with all essential available tools to help them successful[9]. *Chuleeporn Changchit* briefs that every organizations all over the world is adopting latest technologies in order to fulfill their needs. The most attractive part of Cloud computing is impressive attention in both commercial and academic sectors. Cloud technology can access maximum benefits for the education system, not only for its cost effectiveness, but also for the much needed requirements of technology that School, College and Learners-Trainers missed today, which makes learning-teaching easier [2]. *Fardin Amirian* in his article mentions that computing model is totally based on the computer networks like internet. Internet presents a concept for imparting and exploring the computing services. In developed societies the administrators have a specific glance to this field for advancing the quality education system. Cloud computing introduces itself as a suitable and better technology which can make strategies with minimum costs and resources which can control over the management also. It identifies the challenges and barriers in the implementation of cloud computing in schools by extensive and effective studying of cloud computing [7].

*D.Sudha Devi and K. Thilagavathy* suggests the use of cloud computing in their article. It is an emerging technology as stated by the investigators. It delivers IT capabilities as services-on-demand via web resources. Much benefits can be initiated though Cloud technology, it gets suffered through many challenges also, which hinders on adoption of cloud technology in educational industry. This article presented the challenges towards Public Cloud and its possibilities. It has forced to control over Private Cloud and briefed how to set up Private Cloud in Education System. Educational industry like Schools, Colleges and Universities are in higher need of adopting and grasping the cloud technology with all its features [5]. In the year 2010, according to *Intel Education*, Cloud Computing technology is only mostly talked and known about its practice of solutions in the education system. Schools, trainers and educators and IT managers know firsthand that cloud technology changes and the potential it created for youth learners have been constantly and swiftly. Each has brought new offering and opportunities for pedagogy and challenges for deployment. This article produced a brief look of cloud computing to be considered right things for school [8]. *A.V.Nikam and A. A. Patil* expressed in their article that in school education has some challenging problems by adopting cloud computing. At every time school education is changing rapidly by using computer network technology. Now, it is widespread as a regular practice in school education and at home. Cloud networks released a less cost option for monitoring various environments such as educational institutions, schools, colleges, farms, forests, water and electricity department's networks etc. In the school education, computer systems are usually placed at laboratory [1].

## III. RESEARCH METHODOLOGY

The purpose of this research study is to analyze the existing traditional education and currently modern education using cloud computing in Secondary and Senior Secondary Schools. To explore the available opportunities and barriers that cloud computing provides towards educational institutions and implementation of useful suggestions, even upto some measures to control challenges may arise by adopting cloud computing in school education. This study applied a qualitative and quantitative method throughout and analysis on current problems in school education.

Researcher deals with methodology used to administer and

evaluate the effectiveness of knowledge and practice regarding cloud technology and cloud computing among students and faculties of Government Schools, Private Schools and Other Institutes at Rural and Urban Areas of District-Udaipur, Tehsil-Girwa, Rajasthan. It contains different steps that were undertaken which includes importance & objective, hypothesis, problem of study, design, collection of data.

In this study, stratified random sampling technique was used for selecting the samples. The sample size was 439, selected proportionately from total 8 Government and Private Schools and Other Institutes. The data collected from the field in the form of questionnaire was tabulated, organized and analyzed using descriptive and inferential statistical tools, interpreted in different sections and presented through Tabulation and Charts.

***Objectives are carried by this study are given below:***

- To study students and teachers activities and their performance in schools.
- To study the current status of learning and teaching in education upto Secondary and Senior Secondary level.
- To highlight impacts and role of cloud computing in education.
- To measure the level of education with or without adopting cloud technology.
- To analyze the effectiveness of cloud computing in regard to technology.

**A. Definition**

In general, cloud computing can be defined by a set of hardware and available networks that adjoins the power of one or more servers to run various types of services via the internet. Cloud computing is a new emerging concepts, which still has no common definition but many experts and researchers have mentioned it differently.

**NIST (US National Institute of Standards and Technology) defines 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"*[11].

**B. Cloud Computing Service Models**

Cloud computing has been made when various vendors provides cloud technique which has variety of available services merged. Cloud computing is based upon the three service models which are categorized as *"Software as a service (SaaS), Platform as a service (PaaS) and Infrastructure as a service (IaaS)"* where SaaS is known to have an on-demand service i.e. user can access it using a client over a web browser, PaaS is known as a programming platform i.e. developers can easily write test, run and manage applications and IaaS defined as techniques of delivering the cloud computing infrastructure [14].

Three service types have been universally accepted are as follows:

- **Software as a Service:** SaaS is complete operating environment alongwith applications, management, and the user resources interface. It is a type of model, in which application is allotted to the resource client by a little client interface like a web browser usually, and it's the user's responsibility to start and stop with accessing and manage its data and user interaction. It's the responsibility of vendor's by everything from application down to the infrastructure.

It is very important to think about all service models of cloud computing in concerned to hardware and software. When a cloud computing client orders software working in the cloud with utilization of cloud applications on a pay-as-you-go model, it is confirmed to SaaS. With SaaS, the user utilizes the applications as required and is not concerned to the installation of the application, its hardware maintenance. The best example of SaaS allowing is online accounting software, with the latest versions of Quicken and Quickbooks, a much known example. Examples of SaaS cloud service providers are:

- Oracle On Demand
- SalesForce.com
- GoogleApps
- SQL Azure

- **Platform as a Service:** It is known as PaaS. It provides machines called virtual, available operating systems, few applications, services done from resources, making development of frameworks, transactions done, and control over structure. Supplier can deploy its applications in available cloud infrastructure or make use of application that was programmed via set language and tool that are managed by the above PaaS service provider. The client manages the minimum cloud infrastructure, the basic operating systems, and the advanced enabling software's. The client is responsible for initiating and managing the application by its deploying.

Examples of PaaS services are:

- Windows Azure Platform
- Google App Engine
- Force.com
- GoGrid CloudCenter

- **Infrastructure as a Service:** IaaS has provided virtual machines, sufficient storage capacity, minimize infrastructure, and hardware assets as supplied resources that a client can provision. IaaS service provider accepts any manageable with available all infrastructure, while the user has responsibility for other influence of deployment. It can club the operating system, cloud applications, and interactions of user with system. Examples of IaaS service providers include:

- Amazon Elastic Compute Cloud
- Terremark
- Eucalyptus
- FlexiScale

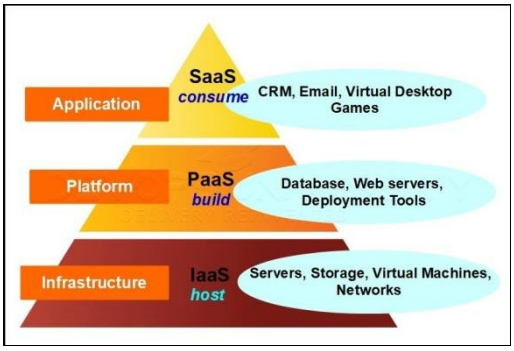



**Fig.1: Cloud Computing Service Models [3]**

### C.Implementing Cloud Computing In School Education

The importance of increased technology in the educational institutions focuses almost exclusive on the ideas that, "*technology is the wave of the future* and youth must *need skill with technology to get update themselves with advance education the real world*".

Cloud computing is mostly suited for academic sectors, which has financial restrictions. This technology has played a vital role. It has still not been widely adopted in education sector. Cloud computing is providing help in academic institutions by reducing costs for purchasing of legacy software's. Massive Open Online Courses are getting enabled for teachers and students in many areas to learn and train themselves with the latest knowledge with technology. Different types of cloud service providers offering free services by providing applications like: emails, document storage, Google docs, calendars, and website making language software's.

In this study, it has been planned to observe the daily learning and teaching activities and how the students and teachers are actually in practice of using cloud-based applications in not only in school but also at home and making themselves in cloud supported learning environment in between classes too. It was proposed to foster and connect classroom teaching and learning experience. Fig.2 shows the structure of proposed learning environment by highlighting major components about school administration, teacher, student, parents and activities during class.

Once every trainer provide the basic knowledge to familiar learning with using cloud application like Google Docs app to students of then it may be very easy for students to adopt cloud computing technology. Trainers need to provide all kind of assignments of every subject, designing according to their syllabus to complete online and offline using cloud app. So that, the students will be having interest to work in groups, using Google Docs and other cloud app. The main aim of this technique is to encourage students to continue their work and share accomplishments during the school timings and after school at home with cloud environment. The teacher should check class work and homework with giving compliments to encourage students for using cloud-based learning environment individually and with group assignments in between classes. Though, Google cloud is perfect, the teacher still recommended students to store their documents both online/offline and on hard-copy even teacher themselves use this feature to store their teaching material too. This kind of practice between student and teachers in learning-teaching, reading, writing assignment activities, students and teachers get more advanced in using cloud computing technology in school education[12].

The deep impact of Cloud Technology on education has simply changed the world of education. Cloud Technology has given a new fresh approach to online education. New web technology has made it easy for students all over the world to get the skills they require to development in society and improve their lifestyle. Students get confidence with computers and internet at much younger age with such impact of Cloud Technology on education. It motivates the students to obtain better thinking skills, remain well informed and got better results for their forthcoming career.

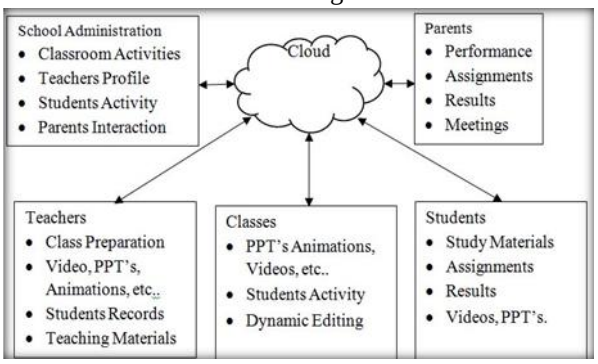



**Fig. 2: Implementing Cloud Computing in School Education [10]**

### D.Cloud Deployment Models

The cloud services can be deployed mainly in four different types as follows:

- ***Public Cloud:*** The public cloud infrastructure is widely available for public use alternatively for a major industry group. It is owned by an organization which selling cloud services.
- ***Private Cloud:*** It is operated for the exclusive use of an organization. It can be managed by that organization or a third party. Private clouds may be either on- or off-premises.
- ***Hybrid Cloud:*** It combines multiple clouds i.e. private or community of public. It has remained unique entities, but still is adjoined together by standard technology or may be proprietary technology, which can enable application and data portability such as: Load balancing with clouds of cloud bursting.
- ***Community Cloud:*** A community cloud is a type of cloud, where the cloud has been organized to serve a common function or purpose. It may be for one or several organizations, but they share common concerns such as their mission, policies, security etc. it is also managed by constituent organization, or by a third party [17].

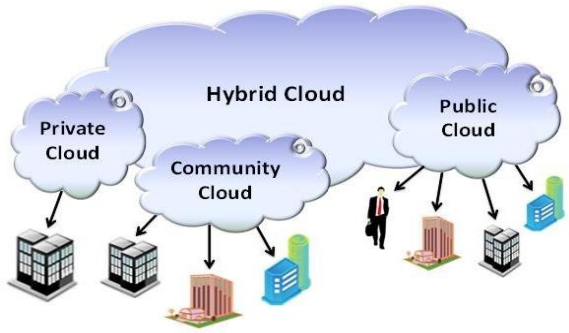
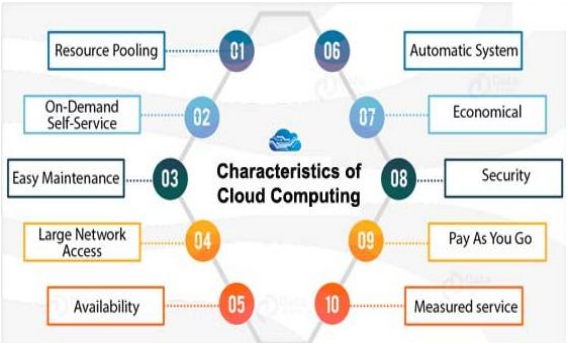



**Fig.3: Cloud Deployment Models [4]**

### E. Characteristics of Cloud Computing

Currently Cloud Computing having many types of features, in which some of mostly recognized and essential characteristics of cloud computing given below and as shown in fig.4:

- ***Broad network access:*** All its services are accessible over the network and can be used through various platforms like: laptops, mobile phones and PDAs.
- ***Rapid elasticity:*** Its services are very quickly and elastically provisioned. Scaling out and scaling in can be done automatically in many cases. Its existing resources for provisioning often appear to be unconstrained to the consumer, and can be gained in such quantity as per requirement any time.
- ***On-demand self-service****:* It says capabilities of computing such as network storage and server time can be selected and determined automatically by the consumer as and when required without any interaction from all service providers.
- ***Resource pooling:*** A model known as multi-tenancy is used for resource pooling and serving multiple customers at same time; a variety of physical and virtual resources are dynamically allocated and reallocated as per customer need. These resources has location independently and customer with no control.
- ***Measured Service:*** It provides a metering functionality, at few level of abstraction. The possessing capability of cloud system is to automatically monitor the resources using transparency of utilized services which can be managed by monitoring and reporting resource usage [6].




- **Fig.4: Characteristics of Cloud Computing [16]**

## IV. DATA ANALYSIS AND PRESENTATION

The investigator has administrated 439 Proforma, from which 335 Proforma was distributed among students and 104 among teachers. The students and teachers belong to selected schools of Rural and Urban area of Girwa - Tehsil, District-Udaipur, Rajasthan. After scrutinizing, investigator received 292 valid responses from students and 74 valid responses from teachers. After collection of samples researcher has analyzed and interpreted the results which are presented in table and fig. below:

**Table I. Distribution of Sample**

| Category | Responses (Faculties) | Responses (Students) |
|---|---|---|
| **Proforma Administered** | 104(100%) | 335(100%) |
| **Proforma Received** | 74(71.15%) | 292(87.16%) |

Table I depicts that total 439 Proforma were administrated, i.e. 335 among students and 104 among teachers. After scrutinizing, investigator received 292 valid responses from students and 74 valid responses from teachers.

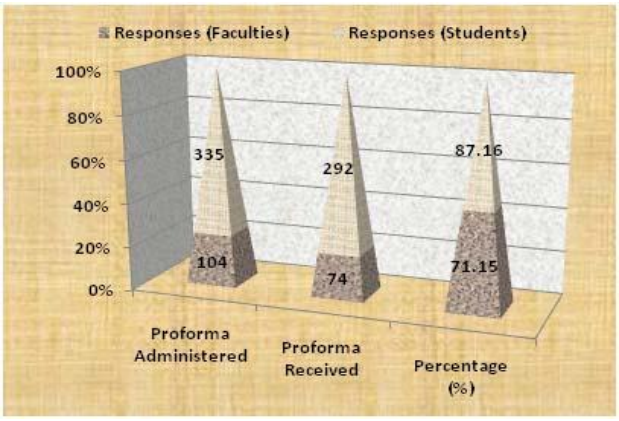



**Fig.5: Distribution of Sample**

The above fig.5 depicts total sample size which was administered among students and teachers. In student responses, after scrutinizing, investigator found 292(87.16%) valid responses and 43(12.84%) responses were rejected due to incomplete information. 104 questionnaires were distributed among teachers, Investigator finally received 74(71.15%) as valid responses and 30(28.85%) responses were rejected due to incompetence.

**Table II. Knowledge about Cloud Computing Technology**

| Knowledge | *Responses* (Student) | Per (%) | *Responses* (Faculty) | Per (%) |
|---|---|---|---|---|
| **Yes** | 226 | 77.40 | 58 | 78.38 |
| **No** | 66 | 22.60 | 16 | 21.62 |
| **Total** | **292** | **100.00** | **74** | **100.00** |

Table II depicts the responses of students regarding their belief on Cloud Technology which is used to improve learning. Some students believe and some may not. According to table total 226 students, 58 teachers are

interested in using Cloud Technology in education, 66 students and 16 teachers were not interested. So we can get maximum response of students and teachers in favor of Cloud Technology used in education.

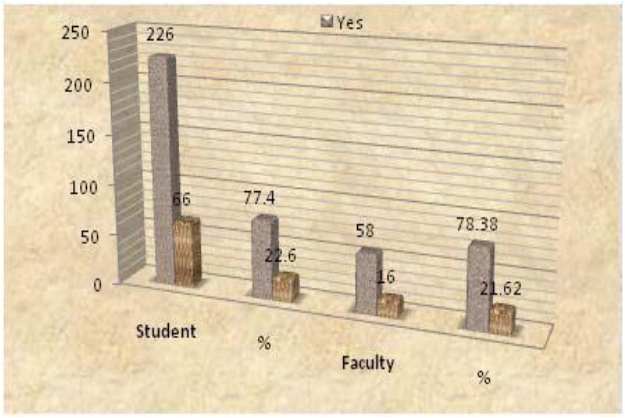



**Fig.6: Knowledge about Cloud Computing Technology**

The above fig. 6 reveals that out of 292 maximum 226(77.40%) of students and 58(78.38%) teachers were responded positively, that they do belief in using Cloud technologies to improve learning, whereas 66(22.60%) students and 16(21.62%) teacher were disagreed of Cloud Technology to improve learning in education.

**Table III. Performance in education can be increased by Cloud Computing Technologies**

| Performance | *Responses (Faculty)* | Per % | *Responses (Student)* | Per (%) |
|---|---|---|---|---|
| **Yes** | 71 | 95.95 | 231 | 79.11 |
| **No** | 3 | 4.05 | 61 | 20.89 |
| **Total** | **74** | **100.00** | **292** | **100.00** |

Table III briefed that 231 students out of 292 and 71 teachers out of 74 responded very positively towards cloud computing technologies and of course our old traditional education system.

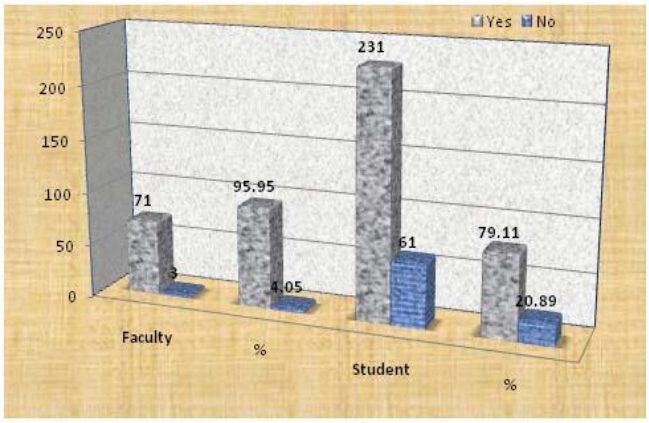



**Fig.7: Performance in education be increased by Cloud Computing Technologies**

Fig.7 states out of 292, a very high positive response from students i.e. 79.11% and 95.95% from teachers out of 74 samples. It shows how the positive response received that cloud education system has better impact in teaching and learning than traditional education system.

**Table IV. Given a chance to study in cloud environment, like to study by cloud technology**

| Cloud Environment | *Responses (Student)* | Per (%) | *Responses (Faculty)* | Per (%) |
|---|---|---|---|---|
| **0- 25%** | 18 | 6.16 | 2 | 2.70 |
| **26 - 50%** | 62 | 21.23 | 23 | 31.08 |
| **51 - 75%** | 107 | 36.64 | 35 | 47.30 |
| **>75%** | 68 | 23.29 | 7 | 9.46 |
| **Can't Say / No Comments** | 37 | 12.67 | 7 | 9.46 |
| **Total** | **292** | **100.00** | **74** | **100.00** |

Table IV very clearly indicating maximum 237 students from three category and 58 teachers from two categories were agreed learning using cloud environment being used at initial level in education system. 37 students and 7 teachers were not interested at al from 292 students and 74 teachers. Therefore, we can say higher number of students and teachers need cloud environment in education and very less students and teachers were not interested.

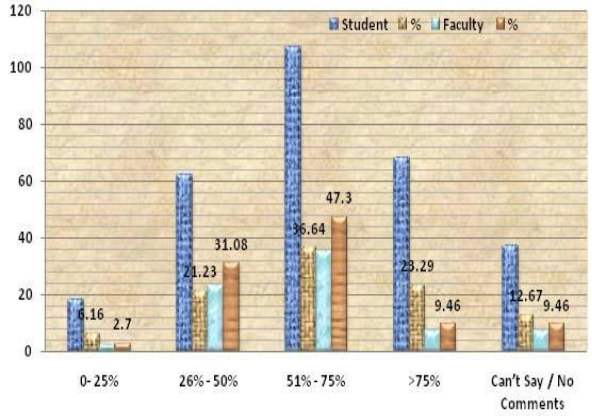



**Fig.8: Given a chance to study in cloud environment, like to study by cloud technology**

The fig.8 depicts that out of 292, 36.64% students from 51%-75% category and out of 74 teachers from same category i.e. 47.30% positively agreed. Only 12.67% of students and little 9.46% students acted as that no such type of cloud environment in education system.

*A. Hypothesis Testing*

- **Hypothesis - 1**

**Null Hypothesis($H_0$):** Students comfortability to solve the problems of study using cloud technology is dependent of their qualification.

**Alternative Hypothesis:($H_a$):** Students comfortability to solve the problems of study using cloud technology is independent of their qualification.

**Table V. Model Summary**

| Qualification | Comfortable | Un Comfortable | Total | Expected Frequency (EF) | Observed Frequency (OF) | Chi-Square $X^2$ equation: $x^2 = \sum \frac{(OF-EF)^2}{EF}$ | DF = (r-1)* (c-1) | P value |
|---|---|---|---|---|---|---|---|---|
| Up to Secondary | 143 | 20 | 163 | 163*248/292 = 138.438 | 143 | **0.150** | = (2-1) (2-1) = 1 | = 0.132932 |
| | | | | 129*248/292 = 109.562 | 105 | **0.190** | | |
| Up to Senior Secondary | 105 | 24 | 129 | 163*44/292 = 24.562 | 20 | **0.847** | | |
| | | | | 129*44/292 = 19.438 | 24 | **1.071** | | |
| **Total** | **248** | **44** | **292** | **Chi Square($x^2$)** | | **2.258** | **DF=1** | |
| **Chi Critical Value from Chi Table @ 5% level of significance = 3.841**<br>**So, The result is not significant @ p < .05** | | | | | | | | |

***Result:***

We observed that-

**P-value = 0.132932 is less than @ 5% level of significance**

**So, Null Hypothesis($H_O$) is accepted & Alternative Hypothesis($H_a$) is Rejected.**

In above Table V, Model Summary of Hypothesis-1 shows calculated value of Chi- Square($x^2$ =2.258) is less than the **Chi Critical Value @ 5% level of significance** from tabulated value = 3.841 at 5% level of significance. So, the null hypothesis is **Accepted**. Therefore, we can say student's comfortability to solve the problems of study using cloud technology is independent of their qualification.

**Hypothesis - 2**

**Null Hypothesis($H_0$):** Imparting education through cloud computing effective for school is independent of the place.

**Alternative Hypothesis:($H_a$):** Imparting education through cloud computing effective for school is dependent of the place.

**Table VI. Model Summary**

| Place | Agree | Dis-Agree | Total | Expected Frequency (EF) | Observed Frequency (OF) | Chi-Square $X^2$ equation: $x^2 = \sum \frac{(OF-EF)^2}{EF}$ | DF = (r-1) *(c-1) | P value |
|---|---|---|---|---|---|---|---|---|
| Govt. School | 31 | 7 | **38** | 38*65/74 = 33.378 | 31 | 0.169 | = (2-1) (2-1) = 1 | = 0.132932 |
| | | | | 36*65/74 = 31.622 | 34 | 0.179 | | |
| Private School | 34 | 2 | **36** | 38*9/74 = 4.622 | 7 | 1.223 | | |
| | | | | 36*9/74 = 4.378 | 2 | 1.292 | | |
| **Total** | **65** | **9** | **74** | **Chi Square($x^2$)** | | **2.863** | **DF=1** | |
| **Chi Critical Value from Chi Table @ 5% level of significance = 3.841**<br>**So, The result is not significant @ p < .05** | | | | | | | | |

***Result:***

We observed that-

**P-value = 0.090566 is less than @ 5% level of significance**

**So, Null Hypothesis($H_O$) is accepted & Alternative Hypothesis is Rejected.**

In above Table VI- Model Summary of Hypothesis-2 shows calculated value of Chi- Square($x^2$ =2.258) is less than the **Chi Critical Value @ 5% level of significance** from tabulated value = 3.841 at 5% level of significance. Therefore the null hypothesis is A**ccepted** and the statement can be expressed "imparting education through cloud computing effective for school is independent on place".

## V. FINDINGS AND RESULTS

It has been explained very clearly, that the influence of utilizing cloud computing technology in enhancing education among students and teachers of Government schools, Private Schools and other Institutions weather belonging to Rural and Urban area. *"Computing is not about computers anymore. It is about advancing technology through human being."* Technology has affected all aspects of global life, transforming the way the world works, plays, and communicates. Cloud computing is helpful for learners and trainers with their own style. It gets enhanced the learning and teaching psychology among students and teachers in effective manner. It is an easiest way for students and teachers to engage themselves in learning and teaching process in the academic transaction.

The study sample included 366 respondents Faculties and Students from selected schools of Rural and Urban area of Girwa - Tehsil, District-Udaipur, Rajasthan. The researchers depended on questionnaires as a tool for data collection for cloud computing and its effectiveness in education. In this section, we reviewed and discussed the results obtained through the questionnaire conducted in various schools concerning to cloud computing. Faculty members and Students filled the questionnaire. Researcher noticed when reviewing the questionnaire responses that upto some extent many respondents are not familiar with good knowledge regarding security risks involved in cloud technology which are very important to know. It shows that the responsible people like Faculties and IT Staff who are given responsibility for imparting knowledge about technology do not educate properly about security problems related to cloud computing, this also one of the serious barrier between teachers and students which must be considered to overcome. The result of the present study shows that 78.38% teachers and 77.40% students have awareness of cloud computing, Advantages of cloud computing are cost saving, ubiquities, scalability, storage, easy in use, paperless environment, multi-user can access, reliability and security. The study found that teachers and students already using cloud computing based services. Most of the teachers and students have trust in adopting cloud technology and have shown their positive attitude towards cloud computing. 90.95% of teachers and 79.11% of students satisfied with cloud computing based learning and teaching and its services and there from majority thought that cloud based services easy to use.

Cloud Computing Education has a great impact in educational industry with bright futuristic results for the future generation and influence of accessing cloud technology in enhancing learning and teaching among students and teachers of Govt. and Private Schools in both Rural and Urban area. Cloud computing having more helpful towards learners and trainers their own pace, it enhances the psychology of research possibilities in college students as well. Therefore, people involved should try to deliver dependable training materials to sustain the faith of the educated mass in cloud education, it is only then that cloud computing teaching and learning will thrive in India. It is very simple way for learners to engage themselves in learning research process in the academic transaction. It can be easily said that no module of learning can ever be labeled as "perfect". Rather it is the changing times that dictate the new blueprints of education. At this point in time, it is only cloud computing education that is effective and is all set to change the education scenario.

## VI. THE BENEFITS OF CLOUD COMPUTING

The benefit of cloud computing in education is the 'key' to upgrade the level of education in current time. The teachers and students experience is highly appreciable with adoption of cloud computing in education. Learning content can be accessed from a particular central point and can be retrieved anywhere anytime. Centralized learning content ensures that the trainers is totally focused on imparting high quality learning experience than struggling with a system that is improper[15].

***The impacts and contribution of Cloud Computing can be seen at School or institutes level with reference to learning and teaching through below mentioned points-***

- ***Easy access*** – All assignments which are planned for students, such as Chapter plans, lab practical, grades, theory notes, makes presentation etc whatever made computerized that can be utilized in teaching comfortably, uploaded and accessed anytime. Carrying devices is not necessary like thumb device, CDs and others. No problem about missing devices or mis-handling, maintenance of hardware's CDs and all and even not a problem to upload information properly.
- ***Say no to photocopies*** – By use of cloud computing technology, the charge of duplication of documents has been almost reduced significantly. Even much more, so that if any students has its own smart devices such as computer, laptop, tablet, etc. Quizzes, tests, assignments. All can be taken, scored, shared with students and parents, and stored.
- ***Saves costing to a higher level*** – Cloud depicts moving away from a CAPEX model to an OPEX model known as pay per use. The services of Cloud can be alternate option for schools, colleges that mostly having shortage of funds, yet still have to manage and investing in technology to advance learning standards. Cloud computing can manage cost savings in concerns to buying, leasing, and managing Xerox machines and printers, ink cartridges, and stationeries.
- ***Collaboration*** – It is utilized with different groups of learners for working on various projects and assignments in the cloud environment.
- ***Quick sharing***–Files and information's can be transferred or communicated through cloud easily know as quick sharing. No requirements of having an extra thumb machine or making more CD or DVD. You just need to send a link to the file(s) destination.
- ***No more file cabinets*** – With cloud computing redundancy, there is no longer the need to both save files digitally as well as in paper format. Cloud computing systems are normal backed-up with scheduled, thus, the chance of missing content are rare significantly. And, it

has no requirements of file storage through cabinets which means practically less classroom space required for teachers and the learners.

- ***Changes in Tracking*** – It is made comfortable with some modifications to a chapter and wants to revert back. Cloud computing technology will store with few multiple revisions and make modern versions of documents, so that students can track evolution of any particular chronologically.
- ***Stability in featuring*** – Scalability is one of best feature of cloud. It is the type of stable technology on which modern era can rely.
- ***More engagement and more productivity*** – In modern scenario Cloud technology is the prime services which research has introduced with the benefits of tablets, its compatibility, and flexibility leads to higher collaboration, greater mobility and engagement. The programs made of based on cloud computing technology to make and sharing exponentially increasing the pedagogical advantages. SafeGove.org reported, 51% of staff surveyed got benefited due to good exam performances.
- ***Granting more security*** – Any information which is stored in cloud basically needs authentication that is Identification and password. It is not easily accessed by anyone but still, it should implement cloud technology at school level. The contents will still be available to both trainers and learners, if it is stored elsewhere. All schools having cloud computing technology and its infrastructure available with wired and or wireless, then, it is easy to implement cloud computing information technology.

## VII. Cloud Computing Challenges and Implications

The new paradigm of cloud computing explores benefits and challenges as compared to previous in education system. In last few years, cloud computing has expanded from being a promising logic; education with its virtualization concept to one of the fastest growing segments of educational industry. However, following number of challenges and implications are currently addressed by Students, Teachers, Researchers, and Academicians, which are related to Security, Reliability, Privacy, Legal problems, Performance, Long-term Feasibility etc [13]:

- A major concern of ***Privacy and Security*** of for cloud adopters in educational sectors because very important data and documents related to examination and institution reside outside the institutions firewalls, therefore any hacker or other type of harm on the cloud vendor's infrastructure may affect all users whose data are stored on the infrastructure.
- Because it is ***not very known used to technology*** and due to underdevelopment of cloud services, it is also one of major concerns for cloud adoption in educational sectors.
- Cloud computing providing many benefits, however there are still concerns on the ***security and confidentiality*** of data stored in the cloud, privacy and regulatory compliance, vendor lock-in, location of the data, legal jurisdiction, and reliability of the cloud service provider have been identified as the major problems to adoption of cloud in educational system.
- Another very major challenging problems which impact reasons for the concern is ***Legal and Jurisdiction***, because all legal problems can freeze a institution into unnecessarily dissatisfactory conditions, therefore, it may caused to legally disputes that can bind vendors and users for so long in laws due to location where the data are located.
- Once the services of cloud vendors are fixed, the institutions have no longer control over the ***physical infrastructure*** where the data are stored. Most of the users may not be concerned with where their data are lying, but many standard schools, colleges, universities and institutions may have hold very confidential information of students, teachers, other staff and about institutions itself such as admission, policies, examination related, results and findings that required high level of confidentiality and privacy. Such problems and barriers may pose threats to the privacy of data and hinder the interest of educational institutions of learning to migrate to the cloud.
- It has major problem of ***lacking of compliance*** to the Service Level Agreements by cloud service providers. It is another main reason behind the slow growing speed of adoption of cloud computing in various educational institutions, because if cloud technology vendors do not fulfill the minimum clause of the Service Level Agreements and if attends to downtimes, it prompts vendors performance gets affected.

## VIII. Conclusion and Recommendations

### *A. Conclusion*

- Education in the Cloud Computing Environment has a great impact not only in schools but also entire educational industry i.e. colleges, universities and other educational institutions with bright results for the forthcoming generation. Cloud technology has its features to uplift learning and teaching techniques of Govt. School and Private School in both Rural and Urban areas.

The basic aim of the study to highlight key points and basic problems and improvements in rural as well as urban school education and will be effective to learners to solve their problems of study in effective manner. It will also lower the inferiority standards of the students of the rural background. It will provide the effective feasible learning solution to rural school by using the cloud computing features in education. It will explore and modernize the traditional learning system. It will reduce the cost of education and will also increase the quality and standard of education. It will turn as if, very useful for undeveloped rural and urban areas to enhance the level of literacy of students. I hope this idea of this study can be useful to eliminate and solve the small problem at school education at ground level, so that our education system can get advanced with implication of such an impactful technique known to be Cloud Computing to all Schools running in both Rural & Urban areas in our country.

In this paper we have discussed a cloud computing based

learning-teaching in educational system. Cloud based e-education will definitely help the students, trainers, staff, schools, colleges, other institutions and also the learners up to a great extent. Mainly students from rural areas of the country will get an opportunity to get the knowledge shared by the trainers on other part of the world. Even Government must take initiative to implement this highly sophisticated educational system in schools and colleges for the better future of forthcoming generation and we believe that this sure to be happened soon.

- Cloud computing should also be an essential part of school education just like student and teacher. Learning-teaching can be improved upto a standard impressively in students and teachers by adopting benefits of cloud computing and its other features in school education.

### *B. Recommendations*

During the study, a number of suggestions were put forth by Principal, Head of Institution, Faculties, other educational expertise and students of the leading school covered in the study. Being advanced technology savvy users of educational intuitions, their suggestions in connection with relevant advantages and features of cloud based services have given due attention in the study. However, based on the findings of the research, the following suggestions are recommended for schools, colleges, institutions, surveys and information center to address cloud based services are very useful for the students and teachers of the institutions. Some of the recommendations for the future are described as follows:

- All educational institutions will have to adopt cloud computing technology in learning and teaching to provide employment oriented results, up gradation of educational environment and to make positive psychology of Trainers and Learners at School or College.
- The present study found that all major educational institutes had adopted cloud computing technology in both rural and urban areas except research institutes who want their data secure. Therefore, research institutes also trying to implement cloud computing technology in maximum services.
- NCERT, RBSE, CBSE, DIET, Govt. and Private Universities, Indian National Education Policies, and other Indian Educational Governing authorities have to take more initiatives in preparation of Cloud Technology Model like G-Cloud (U.K), GI- Cloud (Meghraj), Baadal (IIT-Delhi) and promote all Schools, Colleges, Universities and Other Educational Institutions for adopting Education with Technology.
- Education policies of the government of India and missionary enterprise should be revised with the recommendations of newly adopting cloud technology.
- Some institute libraries using cloud computing technology very initial level, they have to adopt high-level cloud technology to better worth for users.
- All Govt. and Private Schools, other institutions have to develop collaborative work, consortia for cloud computing and design guideline, protocol and policy for the same.
- All educational institutions have to introduce their cloud-based services towards their students and faculties and encourage them to the maximum usage of cloud resources.
- School has to update their courses and add the latest technology like cloud computing, Internet of Things (IOT), Big Data, deep learning and other related technology to future generation for accepting new challenges.
- The government should provide grants or subsidy for effective implementation of a cloud based services in all govt. and private schools, colleges, institutes, organizations and universities.
- There should be publicity for cloud computing adoption in govt. and private schools, colleges, institutes, organizations and universities, library and information centre through a public-private partnership scheme to implement cloud computing in all educational institutions.

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