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# Insight Of E-Learning And Cloud Based E-Learning System With Reference Of Costing And Infrastructure

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**Abstract:**

Cloud-based E-learning systems generally offer lower upfront costs, reduced ongoing maintenance, and easier scalability, making them a more cost-efficient and flexible option in the long term. Traditional E-learning systems, however, involve higher initial investments and more complex maintenance and scaling challenges. In terms of infrastructure, cloud systems provide superior scalability, global access, and reliability compared to traditional, on-premise systems, which are constrained by physical resources. Cloud-based solutions are especially advantageous for large institutions or those serving a global student body.

Cloud-based E-learning systems are more cost-effective and scalable, while traditional systems may still be suitable for smaller institutions with limited budgets or infrastructure but come with greater operational complexity. The present study is an attempt to check the viability of the statements which are mentioned above with the opinion of the respondents.

**Keywords:** E-learning, Traditional, Cloud-based, Institute, Infrastructure

## Introduction:

Cloud-based e-learning, also referred to as virtual learning, involves delivering educational content and experiences through internet-based platforms and services. By leveraging cloud computing technologies, it offers flexible, scalable, and easily accessible learning solutions for individuals, educational institutions, and organizations. In this model, learning materials, resources, and tools are stored on remote servers, removing the need for physical infrastructure. This allows learners to access content anytime and from any location, provided they have an internet connection [1,2].

Cloud-based e-learning offers several benefits, including improved accessibility, flexibility, enhanced collaboration, cost-effectiveness, easy updates, and efficient tracking of learner progress. From a financial perspective, cloud-based systems tend to have lower upfront costs, offer more flexibility, and require less ongoing maintenance, making them more cost-efficient over time. In contrast, traditional e-learning systems often demand higher initial investments and greater responsibility for maintenance and scaling.

When it comes to infrastructure, cloud-based systems provide greater scalability, global access, and superior reliability compared to traditional, on-premise systems, which are constrained by physical resources and local infrastructure. Cloud-based solutions are particularly beneficial for large institutions or those serving a global student body[3-5].

In conclusion, cloud-based e-learning systems are more cost-effective and scalable, while traditional systems may still be suitable for smaller institutions with limited budgets or infrastructure but involve more complex operational management.

**Some Notable Facts**

There is a notable difference between traditional E-learning systems and Cloud-based E-learning systems, particularly in terms of costing and infrastructure. Here's a breakdown of these differences [9,12,13]:

| The Costing | | | |
|---|---|---|---|
| Traditional E-learning System | | Cloud-based E-learning System | |
| Initial Setup Costs | Implementing a traditional E-learning system requires significant investment in physical infrastructure, including servers, data storage, and network equipment. These initial expenses can be substantial. | Pay-as-you-go Model | Cloud services typically operate on a subscription or usage-based pricing model, meaning institutions pay only for the resources they use (e.g., storage, bandwidth, computing power). |
| Maintenance Costs | Ongoing maintenance of both hardware and software is necessary, which often involves hiring specialized IT staff. Regular updates, hardware replacements, and troubleshooting are required for smooth operation. | Reduced Maintenance Costs | With cloud-based systems, the provider handles hardware, software updates, security, and general maintenance, reducing the need for dedicated IT personnel and associated costs, |
| Scaling: | As the number of users grows, scaling a traditional system often demands additional hardware, software licenses, and increased server capacity, leading to higher costs. | Flexible Scaling | Cloud platforms offer the ability to scale resources quickly and easily without requiring large upfront investments. |

The difference factor from Infrastructure point of view [7-8,11]:

| The infrastructure | | | |
|---|---|---|---|
| Traditional E-learning System | | Cloud-based E-learning System | |
| Physical Infra | A traditional system relies on physical hardware, such as servers and storage devices, which must be housed in data centres or server rooms. This infrastructure requires regular monitoring, backups, and updates. | Virtual Infra | Cloud systems use virtualized infrastructure, hosted by providers like Amazon Web Services, Microsoft Azure, or Google Cloud. This allows for virtually unlimited storage, computing power, and bandwidth without the need for on-site physical hardware. |
| Limited Access | Traditional systems are often constrained by physical location and network limitations. Access can be slower or less reliable, especially in remote areas or during peak usage times, particularly if the institution's local network is not robust | Global Access | Cloud-based systems are accessible from anywhere with an internet connection, enabling seamless access to learning materials and communication, especially beneficial for remote or international learning. |
| Limited Disaster Recovery | Backup solutions for traditional systems might include on-site or off-site data storage, but they often lack the redundancy and reliability of cloud-based systems. | Advanced Disaster Recovery | Cloud providers typically offer built-in redundancy, automatic backups, and disaster recovery options, ensuring that data remains secure and accessible even in the event of hardware failure. |

## Respondents Statistics:

The survey study and data collection were completed in 2022, initially involving 400 respondents. After the data gathering process, we received 300 fully completed responses. Among these, 60 respondents were technocrats and administrative service professionals from across Rajasthan, 55 were e-learners, and 185 were students. All respondents were engaged with both cloud-based e-learning and traditional learning methods.

| SN | Details of Statistics | Figure | |
|---|---|---|---|
| 1 | Technocrats and Administrators (Respondents) | 60 | 20% |
| 2 | E-Learner / User (Respondents) | 55 | 18% |
| 3 | Students (Respondents) | 185 | 62% |
| Total Respondents | | 300 | 100% |

In the percentage form it is depicted that the percentage of Technocrat and administrative is 20%, the figure of E-learner is 18% and percentage of students as respondents is 62.

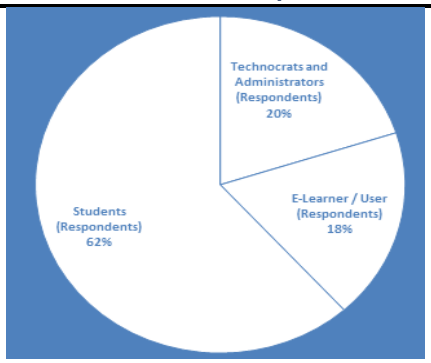


Figure-1: Respondents Statistics

**Objective:**

The objective of the present study is to assess the view of respondents about higher education institute with reference of costing and infrastructure details of traditional e-learning system and cloud-based e-learning system. The study is accomplished with the opinion of the respondents.

**Hypothesis (H1)**

The assumptions regarding the significance of whether the patterns and supporting technologies of traditional and cloud-based e-learning systems are sufficient to deliver content for modern higher education were tested.

**Null Hypothesis(**$1H_0$): There is a significant difference between E-learning system and Cloud based E-learning system in higher education.

**Alternate Hypothesis**: (1Ha): There is no significant difference between E-learning system and Cloud based E-learning system in higher education.

To evaluate respondents' opinions on the significant differences between traditional e-learning systems and cloud-based e-learning systems in higher education, their perspectives were gathered using specific questions designed to assess both variables. These questions included:

- Whether the patterns and supporting technologies of traditional e-learning systems are sufficient to deliver content for modern higher education.
- Whether the patterns and supporting technologies of cloud-based e-learning systems are sufficient to deliver content for modern higher education.

The collected opinions were analysed to identify similarities or significant relationships between the two variables. The findings from this analysis are presented below.

**Table:1**

Analysis of the Significant Difference Between Traditional E-learning Systems and Cloud-based E-learning Systems in Higher Education

| Question / Variables | N | Mean | t | Result |
|---|---|---|---|---|
| Whether the patterns and supporting technologies of traditional e-learning systems are sufficient to deliver content for modern higher education. | **300** | **3.25** | 7.66 | Not Significant |
| Whether the patterns and supporting technologies of cloud-based e-learning systems are sufficient to deliver content for modern higher education. | **300** | **3.76** | | |

't' Critical one tail value on 0.05 = 1.655

A total of 300 samples were analysed for each variable. Given the sample size, the "t-test" was determined to be the most appropriate method for testing the hypothesis. Although a "z-test" for two samples could also be applied and yield accurate results, the "t-test" was preferred for this analysis. Table-1 provides the details of the "t-test" applied to assess the respondents' opinions regarding the statement: *"There is a significant difference between E-learning systems and Cloud-based E-learning systems in higher education."* To determine significance, the critical one-tailed value of the "t-test" at a 0.05 level of significance (1.65) was used as a benchmark. The calculated "t" value was found to be 7.66, which exceeds the one-tailed critical value of 1.65 at the 0.05 significance level. Consequently, the null hypothesis was rejected, and the alternative hypothesis was accepted. This result indicates that there is no significant difference between E-learning systems and Cloud-based E-learning systems in higher education.

**Hypothesis (H2)**

Evaluating the assumptions regarding the significance of whether the patterns and supporting technologies of traditional and cloud-based e-learning systems are adequate to deliver content effectively for modern higher education.

**Null Hypothesis (**$2H_0$): There is a significant difference between E-learning system and Cloud based E-learning system on the basis of costing and infrastructure.

**Alternate Hypothesis** ($2H_a$): There is no significant difference between E-learning system and Cloud based E-learning system on the basis of costing and infrastructure.

To evaluate respondents' opinions on the significant differences between e-learning systems and cloud-based e-learning systems in terms of infrastructure costs, their perspectives were gathered using specific questions designed to assess both variables. These questions included:

- The costs and maintenance of traditional e-learning infrastructure and hardware do not significantly impact the learning system.
- Managing cloud-enabled learning systems incurs comparatively lower infrastructure and hardware costs.

The collected opinions were analyzed to identify similarities or significant relationships between the two variables. The findings from this analysis are presented below.

**Table:2**

Analysis of the Difference Between E-learning Systems and Cloud-based E-learning Systems in Terms of Costing and Infrastructure

| Question / Variables | N | Mean | t | Result |
|---|---|---|---|---|
| The costs and maintenance of traditional e-learning infrastructure and hardware do not significantly impact the learning system. | **300** | **3.71** | .842 | Significant |
| Managing cloud-enabled learning systems incurs comparatively lower infrastructure and hardware costs. | **300** | **3.66** | | |

Table-2 presents the details of the "t-test" applied to evaluate respondents' opinions on whether "There is a significant difference between E-learning systems and Cloud-based E-learning systems in terms of costing and infrastructure." For this test, the critical one-tailed value of "t" at a 0.05 significance level, which is 1.65, was used as the threshold.

The calculated "t" value was 0.842, which is lower than the critical value of 1.65 at the 0.05 level of significance. Consequently, the null hypothesis was accepted, and the alternative hypothesis was rejected. Therefore, it can be concluded that "There is no significant difference between E-learning systems and Cloud-based E-learning systems in terms of costing and infrastructure."

## Result:

As per the result, it is noticeable that Table-1 assess the respondents' opinions regarding the statement: "There is a significant difference between E-learning systems and Cloud-based E-learning systems in higher education." To determine significance, the critical one-tailed value of the "t-test" at a 0.05 level of significance (1.65) was used. The calculated "t" value was found to be 7.66, which exceeds. This result indicates that there is no significant difference between E-learning systems and Cloud-based E-learning systems in higher education. Similarly, Table-2 presents the details for opinions whether "There is a significant difference between E-learning systems and Cloud-based E-learning systems in terms of costing and infrastructure." For this test, the critical one-tailed value of "t" at a 0.05 significance level. The calculated "t" value was 0.842, which is lower than the critical value of 1.65 at the 0.05 level of significance. Consequently, the null hypothesis was accepted, and the alternative hypothesis was rejected. Therefore, it can be concluded that "There is no significant difference between E-learning systems and Cloud-based E-learning systems in terms of costing and infrastructure."

## Conclusion:

The study results indicate that e-learning is a widely adopted and popular learning approach. However, cloud-based e-learning demonstrates the capability to deliver superior services and infrastructure compared to traditional e-learning systems. Consequently, the quality of cloud-based e-learning surpasses that of traditional e-learning systems, particularly in terms of costing and infrastructure standards.

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