Original Article

Awareness of Cloud Services among Students in Rural Vs Urban Areas

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Abstract

This study observed the awareness, use, and issues with cloud services among students in rural and urban locations while looking for gaps that create the digital divide. Cloud computing become an essential educational tool by accessing online learning, collaborative projects, data storage, and virtual classrooms. Still, the access and adoption of cloud services is different with geographical and socio-economic status. The research used a structured survey-based quantitative approach and receive the responses from 400 students from rural and urban area equally. The research findings indicate that as per data the students are aware of cloud services such as Google Drive, iCloud, and Dropbox, difference is existing in experience. The urban students reported that a greater knowledge to professional tools and advanced computing platforms supported by a stronger infrastructure as well as the institutional support and guidance. The rural students showed dependency on basic free services with some barriers such as poor internet connectivity, lack of training, complexity and less awareness of the technology. In both the rural and urban groups, the concern about data privacy and security is observed. The findings indicate it is essential to step in with things like training, low-cost access, and improved infrastructure in rural areas. The research adds value by showing how digital policies can minimize the urban-rural gap and provide benefits of equality of cloud services.

Keywords: Cloud Services, Digital Divide, Student Awareness, Urban-Rural Divide, Challenges in Learning.

Introduction

Cloud computing is one of the most disruptive technologies of the 21st century, changing how people, organizations, and educational institutions access and use digital resources. Cloud computing is defined as a paradigm that provides computing services, including storage, processing power, and applications, over the Internet. Such services provide scalable, flexible, and affordable options compared to traditional IT infrastructures [1]. With the growth of cloud services such as Google Drive, Zoom, and Amazon Web Services, this technology has growing in the corporate sector as well as education, health care, and government sectors.

Cloud computing and cloud services is now essential for the education. It enhances e-learning platforms, online assessments, collaborative projects, digital libraries, and virtual classrooms. It enables students to have access to quality resources, regardless of their location. For developing countries such as India, cloud computing is seen as a necessary resource to help close the gap in education by providing low-cost and scalable learning platforms. Recent research studies also highlight that cloud resources usage in the education has emerged as a powerful tool to reduce the digital divide in development [2]. However, the significant differences and inequality in actual usage and awareness that exist, based on socioeconomic and geographic factors.

So one of the main divides in the Indian education system is between the urban and rural students. According to [3] urban regions are usually defined as a places with a high population, well-developed infrastructure, and non-agricultural economic activities. In comparison, rural areas are marked by lower population density, limited infrastructure, and economies often dependent on agriculture and most on natural resources [4]. This differences have a direct impact on students' access to cloud services and knowledge of new technologies.

Urban students typically have higher access to digital platforms, high speed internet, and also the current learning tools. In contrast the rural students sometimes face the poor connectivity, lack of infrastructure, and very fewer training opportunities.

Previous research has revealed the digital divide between rural and urban areas, with differences not simply in access, but also in knowledge and use of ICT resources. Government strategies like Digital India have aimed at improving access to the internet and digital literacy, but student's recognition and practical use of cloud services are still inconsistent [5]. Understanding student's awareness levels may help the policymakers, educators, and technology providers in creating the new policies or stepping in to support fair access and skill development, as students are the primary beneficiaries of the future technology and developments. Observed studies continue to show significant differences in cloud technology awareness as well as cloud services knowledge between rural and urban students, point up the role of digital literacy programs [6].

Globally, cloud adoption has witnessed exponential growth. Reports from Gartner estimate that worldwide end-user spending on public cloud services will reach over $600 billion in 2023, reflecting the increasing reliance on cloud technologies in both developed and developing nations. This growth is not limited to businesses alone; higher education and schools are also embracing cloud-based platforms for digital learning environments, online collaboration, and resource sharing [7]. The COVID-19 pandemic further accelerated this adoption, as institutions rapidly shifted to online and hybrid learning, underscoring the importance of cloud services in ensuring continuity of education.

This research therefore focuses on examining the awareness of cloud computing services among students in rural versus urban areas. By analysing these differences, the study aims to highlight existing gaps, identify key factors influencing awareness, and provide recommendations for fostering digital inclusion in education. The findings will not only contribute to academic discourse on technology adoption but will also have practical implications for bridging the rural-urban divide in cloud service awareness.

The objectives of this research are:

- To determine the level of student awareness of cloud services.
- To compare awareness between rural and urban students.
- To identify problems faced by students in learning about cloud services.
- To examine the types of cloud services commonly used by both groups.

Research Methodology

In this study, an exploratory study was done to identify the awareness level of cloud computing services by rural and urban students. A structured self-administered questionnaire was developed to capture the primary data. The items in the questionnaire were modified from existing studies on cloud computing adoption and awareness in educational settings to guarantee reliability and validity of the instrument.

The 40-question questionnaire was organized into four sections. The first covered the demographic profile of the respondents in terms of gender, age, residential area (urban/rural), year of study, and specialization. The second section covered the awareness and knowledge of the respondents regarding cloud computing concepts and services. The third part enumerated the level of actual utilization of cloud services among the learners, including file storage, web collaboration tools, and e-learning software. The fourth part ascertained the perceived advantages, difficulties, and hindrances in the uptake of cloud services within their learning setup.

The population under study comprised learners studying in institutions of higher learning in both rural and urban areas. A sum of 400 students were surveyed, and they were from various disciplines and levels of studies. Among them, 200 responses were gathered from urban fields and 200 were gathered from rural areas to provide a comparative balance in analysis. The sampling technique used was purposive sampling, where the focus was on targeting students with exposure to online or digital learning environments.

The data gathered were quantized and analysed utilizing statistical techniques to assess differences in awareness, usage trends, and attitudes among the two groups. Descriptive statistics (frequencies, percentages, mean scores) were employed to present demographic attributes and overall trends, and inferential tests like chi-square test and Mann-Whitney U Test were utilized to establish significant differences between rural and urban respondents.

This methodological framework enables one to have a complete understanding of students' awareness and utilization of cloud services and gain knowledge about the contribution of geographic and socio-economic factors towards digital adoption.

Data Analysis and Findings

The number of participants in the questionnaire amounted to 400 respondents, distributed across urban and rural areas. The respondents included both undergraduate and postgraduate students from colleges. Among them, 58% were female and 42% were male, with ages ranging from 18 to 25 years. Regarding education level, 62% of respondents were undergraduates, while 38% were postgraduates. Table 1 shows the demographic characteristics of the respondents in this format.

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Female	232	58
	Male	168	42
Age (years)	18–20	140	35
	21–23	180	45

	24–25	80	20
Education Level	Undergraduate	248	62
	Postgraduate	152	38
Location	Urban	240	60
	Rural	160	40

Table 1: Demographic Characteristics of Respondents (N = 400)
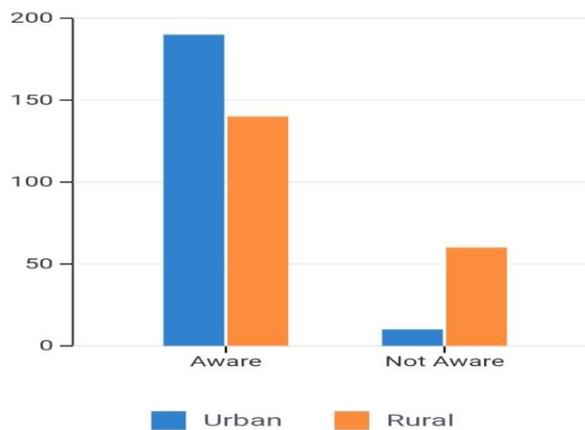

Figure 1: Awareness of Cloud Services

For the respondents' awareness, Figure 1 illustrates that the majority of students from both urban and rural areas are aware of cloud services. Specifically, about 190 urban respondents and 140 rural respondents reported being aware, while around 10 urban and 60 rural students indicated they were not aware of cloud services. This highlights that awareness is relatively high in both groups, though urban students showed slightly higher awareness levels compared to their rural counterparts.

In terms of actual usage of cloud services, a significant proportion of students reported frequent reliance on cloud-based platforms for both academic and personal purposes. Services such as Google Drive, iCloud, and Dropbox were consistently identified as the most widely adopted tools, with more than half of the respondents indicating usage on a daily or weekly basis. These tools were particularly preferred for academic assignments, collaborative projects, and personal data storage due to their ease of access and free storage options. Urban students displayed a wide usage range, with reporting familiar at the platforms like OneDrive, AWS, and Google Cloud, that are usually brought in by institutional subscriptions or technical training. Rural Students are mostly dependent on free and simple services with low technical demands. These findings are consistent with previous studies [8], which reported that students mostly use cloud services for academic purposes, like Google Drive and Microsoft OneDrive, being the most used tools.

The survey observed the challenges that had effective adoption and deeper connection with cloud services. Rural students frequently cited issues such as poor or unstable internet connectivity, lack of training programmes, and limited knowledge of cloud platforms and cloud services. Urban students, enjoying and having better access and technological knowledge, identified challenges such as high subscription costs, concerns over data privacy, data security and the step in learning cloud services. A reoccurring concern across both groups was digital security, with many students hesitate to store sensitive data online due to fear of data loss, breaches and cyberattacks. These findings show the observations of [9], who generally identified in a previous study that data privacy and security are prime concerns in the implementation of cloud awareness in education. Our study found further progress with regards to general awareness and using cloud services cautiously, suggesting that students are increasingly willing to adopt cloud services despite lingering security concerns.

Students additionally shared valuable recommendations for improving the adoption of a cloud service including structured training, highly affordable or subsidized premium access, improved internet infrastructure in rural communities, and public campaigns to increase awareness of digital safety and best practices. This aligns with [10], who found that there is a significant difference between the influence of perceived usefulness and perceived ease of use on cloud computing adoption in higher education institutions, indicating varying levels of readiness among institutions. In comparison, our study shows that institutions are gradually improving readiness, with 43% of students reporting confidence that their colleges were well-prepared to integrate cloud based learning solutions. Similar findings were reported by [11], who have been noted that institutional accessibility and technological infrastructure as essential part of cloud adoption in education

Together, these findings suggest that students are gradusly adopting the cloud, achieving its full potential requires making systematic measures to strengthen the infrastructure, make it affordable, provide comprehensive training, and boost trust in digital security particularly for rural students who continue to face significantly greater barriers.

Discussion

The research indicates a definite trend of growing awareness and use of cloud services amongst students, but also significant differences in usage and engagement between urban and rural students. Urban students are more likely to investigate a variety of cloud platforms, including professional and enterprise-level services, suggesting the importance of technology exposure and institutional support in relation to students' adoption behaviour. Rural students likely to use simple, free cloud tools, which magnifies that essential and accessibility are the motivators compared to investigation or skill development. Overall, rural and urban student's experiences different impact of digital infrastructure and educational resources on technology adoption and technology usage The challenges and difficulties identified in the present study are connected with more institutional and geographical problems. The restricted access to the internet and absence of guidance for formal use for students in rural areas suggest access is not that sufficient, and meaningful use includes access that is supported by skills development opportunities as the main part. Even sometimes urban students also face problems to meaningful use when they have higher access to the cloud resources when including cost, complicated interfaces, and trust of security and data privacy indicating that moving to distributed resources are simply one part of use. It was the unique theme that stand up for both groups a shared concern about the **digital** safety. Both groups appear to have some awareness of the risks of being online, and the need for education on safe use of the cloud and cloud services.

Student responses suggest possible things for enhancing and adopting knowledge of cloud services. Structured training programs, subsidies, and institutional support can address the issues of knowledge and resource barriers. Increased awareness around digital safety and privacy, along with education around the security of cloud platforms, can reduce hesitation and constrain trust. Further, the difference in how students engaged with cloud use (urban students to develop skills and professionalism; rural students to access immediate course needs) reaffirms that interventions should be developed within a specific context and focus on the unique needs of different students.

The research demonstrates that cloud service adoption related with availability but also with capability, confidence, and grasp applicability. The need for a multi-dimensional strategy around infrastructure, affordability, usability, and security is observed. Institutions of learning willing towards these can arrange a more balanced and efficient adoption of cloud-based services and cloud-based technologies to the benefit of students in urban and rural environments by the ability to improve the literacy and growth in digital learning.

Conclusion

Through the analysis of survey data, this research investigated the awareness and usage of cloud services between students from urban areas and students from rural areas. The findings suggest that even if most students are aware of cloud-based platforms (e.g., Google Drive, iCloud, Dropbox), rural students likely to connect with basic, free services mainly, whereas the urban students seem to connect with the most common, basic, free services while also include some more advanced or professional tools (e.g., AWS, OneDrive). This prediction of students from rural areas agreeable with more limited services likely relates directly to the issues of accessibility and infrastructure.

The challenges such as limited internet connectivity, lack of training, cost issues, and concerns about data security and data privacy continue to guide usage patterns. Even with these barriers, students acknowledge the benefits of cloud services for academic work, collaboration, and personal data management. Institutional accessibility is improving, but further support is needed to ensure equal access and effective usage across all regions. Global organizations such as UNESCO [12] also stress that digital equity policies, inclusive cloud infrastructure are most essential to promote the fair access for all learners and users.

Recommendations:

- Improve internet connections, especially in rural areas, to increase cloud access.
- Arrange training on cloud tools to minimize barriers to skill and confidence.
- Provide affordable cloud access or to sponsor cloud access for students.
- Promote awareness of and education on digital security and safe use standards.

In conclusion, the findings highlight the importance of addressing the digital divide in education. Targeted actions such as improving infrastructure, offering training programs, and providing all students an equal access to cloud services can improve the knowledge and use of cloud services.

If these gaps can be bridged, then educational institutions can utilize cloud services as a medium of learning and teaching, can have greater academic connections and social interaction, collaboration, and skill development for both urban and rural students.

Acknowledgement

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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