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Utilization of Cloud Computing Services among Student Teacher Educators

P. Sasikala[*,1], M.Eswaran [**] and M. Vakkil [***]

[*] St.Xavier's college of Education, Palayamkottai, Tamil Nadu
[**] Vysya college of education, salem, Tamilnadu
[***] Department of Education, Periyar University, Salem, Tamil Nadu
E-mail: [1]<sasi2020kala@gmail.com>

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ABSTRACT Cloud computing services is an innovative technology in higher educational institutions. This study assessed that the utilization of cloud computing services among student teachers. The descriptive survey methodology was used. The population represented by the samples 300 student teachers was selected convenient sampling technique from Namakkal district in Tamil Nadu. The tool "scale for utilization of cloud computing services" was used for data collection. The research results indicate that 43.3 percent of teacher educator have moderate level utilization of cloud computing services and there is a significant difference among teacher educators who having computer at home are better than those teacher educators who haven't computer at home in utilization of cloud computing services.

INTRODUCTION

In this 21st century, teacher educators must be effective managers of learning rather than the principal source of knowledge. In today's classroom, using communication technology aids, the student will be able to look up information on almost any subject, and many of the files accessible to the student could be for learning to take place. Some structure needs to be imposed on the sequence of accessing this information (Paul et al. 2023). The education industry has seen significant changes as a result of the rapid progress of information technology. According to Xing et al. 2024, Online education has become a vital instrument for improving educational efficacy and accessibility. The present age is termed the age of science and technology, and hence, one finds that science and technology have their impact on every walk of life, including the education of the child, therefore, the concept known as cloud technology has come into existence (Sasikala and Nachimuthu 2022). Now communication and cloud technology have become major resources for teaching and learning in higher education (Shahzad et al. 2020).

"Cloud computing" refers to services and programs that utilize virtualized resources and may be accessed through well-known network and networking protocols. It differs due to the idea that resources are imaginary and infinite. Many different cloud types have been established to better define cloud computing. The deployment model and the service model are two different types of clouds (Zoleixa 2020). Cloud computing has enabled education to shift away from textbooks and towards a technologically-based approach to sharing and receiving knowledge. However advantageous it may be, institutions must be aware of the obstacles and work hard to maintain seamless and safe operations (Pappas 2024).

Deployment Models

The deployment model explains both the cloud's function and its exact location. Four deployment models such as public, private, hybrid, and community are defined by the National Institute of Standards and Technology (NIST).

Public Cloud

An organization that offers cloud services maintains the infrastructure of the public cloud, which is open to its general public or a major industry sector.

Private Cloud

The infrastructure of a private cloud is maintained by an organization only for its purpose. The cloud may be managed by that business or by another organization. On-site or off-site private clouds are also possible.

Hybrid Cloud

A hybrid cloud is made up of various clouds (public, private and community), each of which maintains its unique identity while being combined into a single entity. A hybrid cloud may offer both application portability and standardized or exclusive access to data and applications.

Community Cloud

A community cloud is created to satisfy a common need or purpose. The expectations in terms of their objective, policy, security, and regulatory compliance are the same for all businesses, whether there are one or many of them.

Service models

Several manufacturers now offer clouds that include a wide range of services as cloud computing and become more popular. Another set of requirements is added by the service model, which is an additional service that is provided. Three service kinds are generally recognized (Muhammad and Abdullahi 2021).

IAAS

Infrastructure as a service enables clients to install services such as Physical assets, digital infrastructure, virtually storage, and virtual devices. Examples of infrastructure as a service include Amazon EC2 (Elastic Compute Cloud), RackSpace Cloud, Linode, FlexiScale, GoGrid, and Eucalyptus.

PAAS

A platform as a service offers operating systems, virtual devices, and frameworks and application interfaces for developing new applications, transactions, and control structures. The operating systems, supporting apps, and cloud infrastructure must all be maintained by the service provider. Installing and maintaining the programmes that it is delivering are the client's responsibilities. For example, GoGrid CloudCenter, Windows Azure Platform, Google AppEngine, and Force.com

SAAS

Software as a service consists of an entire operating system, including programmes, add-ons, and a user interface. In the Software as a Service (SaaS) paradigm, the client's responsibility is restricted to providing and maintaining its data and managing users' interactions, while the client receives the service through a thin client interface. The vendor oversees everything, including the infrastructure and the application. For example, SalesForce.com, Oracle on Demand, Google Apps, and SQL Azure (Barrett 2020).

Cloud Computing Feature

Cloud computing feature is self-service, which is available when needed, with access to many networks, pooling of resources, elastic quickly, assessed service, reduced expenses, utilizations made simple, service quality, reliability, outsourced it management, upgrade and maintenance made easier, reduced entry barrier, use of cloud-based storage, utilizing productivity software, the use of webmail, connectivity with the cloud, streaming and using media, and utilizing mobile cloud (Sivakumar and Singaravelu 2016).

From the review of past studies, it is found that the utilization of cloud computing is very low. Grover and Nandal (2024) investigated education systems employing cloud computing and developed a recommended paradigm. This chapter suggests a solution to address the problems with the current online education system via utilising cloud technology learning and Edu-Cloud computing. With the help of these advanced cloud technologies, educators can quickly share educational content, students can get timely notifications about tests, assignments, and other essential data, and educators can forecast a learner's ultimate grade and engagement level.Paul et al. (2023) conducted a scientific evaluation of the influence of cloud computing on education, teaching, and research. This study revealed that e-learning using the cloud enables live classes learning, similar to a classroom atmosphere, while also enhancing conventional education with current features and services. It is also worth mentioning that cloud-based educational systems allow students from many locations, including nations, to collaborate on a single file in real-time. Cloud computing-based technologies make educational systems such as academics, administration, and office management easier.

Podeschi and DeBo (2022) investigated how to incorporate the AWS Cloud Practitioner Certifi-

cation into a course on systems administration. Among cloud providers, Amazon Web Services (AWS) holds the largest market share.This research discusses cloud computing in general, as well as a few examples of cloud computing services and their benefits within the framework of a training curriculum for electrical engineers. The research study's Electrical Engineering Education Study Course makes use of cloud-based services (Baharuddin et al. 2021). Aydin (2021) reported that cloud technology has significant potential to help institutions during this coronavirus season quickly resolve their issues. The findings revealed that the circumstances and issues with using the cloud service paradigm in the road map for resolving these issues because of the research, which attempted to identify the current circumstances and issues with the adoption of the cloud service model at universities. In this regard, a hybrid cloud computing adoption paradigm was suggested for universities to help them overcome their highlighted problems.

Al-Hajri et al. (2021) studied that to determine the essential variables that affect Omani higher education's acceptance and use of cloud computing solutions. The results showed that views on cloud computing usability, usefulness, reliability and responsiveness all have a significant influence on whether individuals intend to utilize it in this circumstance. The fact that this study, namely COVID-19, is among the first to investigate the problem of cloud computing utilization during crises. Amil (2020) discovered that on college campuses, Mobile cloud computing service adoption is still in the early stages. This study examined that important elements that influence whether mobile cloud computing is used on college campuses to bridge this knowledge gap. The result showed that Saudi institutions are still reluctant to use mobile clouds because of privacy and security concerns. Finally, the conclusion of this research offers useful recommendations to decision-makers, mobile cloud service providers, and educational institutions that will help them successfully use mobile cloud computing technology. Ahmad et al. (2024) highlights the need of adopting a more inclusive educational approach that makes use of technology to improve learning results and accommodate students' unique needs in the current educational environment.

Objectives of the Study

The primary objectives of this study was to ascertain the level of utilization of Cloud Computing Services among teacher educators and to analyze the significant difference in utilization of cloud computing services among teacher educators with respect to their gender, age, major group, locality, and had a computer at home.

Hypotheses of the Study

The hypotheses of this research where there is no significant difference in utilization of cloud computing services among teacher educators with respect to their gender, age, major group, locality, and computer at home.

MATERIAL AND METHODS

Method

The researchers adopted the descriptive survey methodology in order to achieve the study's goals. This method applied to analyses the utilization of cloud computing services among teacher educators.

Participants

The sample used in the research is selected by simple random sampling techniques, which include 300 samples from M.Ed colleges at Namakkal district in Tamil Nadu. Out of 300 student teacher educators, student teachers were selected from PGP College of Education, Gnanamani College of Education, King college of Education, Vivekanandha college of Education, KSR college of Education and Krishna College of Education.

Research Instrument

In the present study, the tool "scale for utilization of cloud computing services was developed by the researchers. This scale is used to data collection for this research. The data gathering tool consists of the demographic details of the respondents, questions on how cloud computing is being utilized, the number of occurrences of utilizing cloud computing, the teacher educator's insight on the use of cloud computing and the level of satisfaction. After the respondents had enough time to complete the questionnaire, the researchers will collect the data-gathering tool. The collected data used for analysis and find out the result.

Standardization of the Tool

It is an important to remember that the questionnaire contains details about cloud computing. They serve a very narrow purpose. They are frequently one-time data collection tools with a short duration that are used on a small population. However, they are always working to increase the questionnaire's validity and reliability. The scale was applied the standardization process such as Using the Cronbach's alpha technique, it has been found that reliability value, it was 0.68 (N=30).

The scale has good content validity in addition to face validity because all items were connected to the main variable. Experts' assessments make it clear that the scale's components have a direct bearing on the idea of utilization of cloud computing services.

Phases of Tool Development

Since there was no standardized tool for the utilization of cloud computing services, an appropriate tool was constructed. The development of the tool was done in several phases as explained.

Phase I: Collection of Information

Collection of information regarding utilization of cloud computing services to ensure adequate arrangement of all the possible and likely sources relevant introduction was approached to prepare the universe of items the following sources were adopted. Discussions with the persons With the utilisation of services provided by cloud computing were conducted related to research studies.

Phase II: Item Pooling and Arrangement of Items

All the information was through various sources by the investigator and the supervisor and analyzed and several items were constructed for the questionnaire and constructed validity was ensured.

Phase III: Expert's Opinion and Evaluation of Items

The prepared 54 items were given to the experts for their opinion. They carefully examined each question and gave their opinion and gave valuable suggestions based on which the necessary changes were made.

1. To indicate whether the items were clearly stated and classified
2. To suggest necessary modifications, if any, the list of items was given to the language expert with a request to examine vocabulary levels, syntax, and meaning.

Phase IV: Finalization of the Tool

The final version of the tool has 54 items made by the investigator based on the student teachers' opinion and reliability process.

Description of the Tool

Utilization of cloud computing services is a five-point scale with 54 statements. The teacher educators were requested to collect the responses based on their preferences and responses are n strongly agree (SA), agree (A), undecided (UD), disagree (DA), and strongly disagree (SDA). This questions are categorized under five dimensions of awareness, importance, usability, accessibility, and complexity.

Administration of the Tool

The researchers collected the data from proper channel to contact the principal of the selected institutions and permissions were obtained. The researchers requested teacher educators to fill up the scale for data collection.

Scoring of the Tool

The scale has been scored accurately by the researchers. The five-point scale consists of strongly agree, agree, undecided, disagree, and strongly disagree, and its scoring procedure was 2, 1, 0, -1 and -2.

RESULTS

This section describes the results obtained through survey data on utilization of cloud computing among teacher educators through collected questionnaire scores. These scores were obtained through the administration of a tool on the utilization of cloud computing, which was analyzed

and described using inferential statistics. The data were analyzed for the total scores employing the independent sample 't'- applying the version of the Statistical Package for Social Sciences (SPSS)-24.

Testing of Hypotheses

The independent samples 't'-test was employed to test the framed null hypotheses and the results are presented in the tables given.

Using the dimensions, the gender At the 0.05 percent level of significance, the estimated "t" values of 0.72 (Awareness), 0.39 (Importance), 0.88 (Usability), 0.67 (Complexity), and 0.15 (Accessibility) were found to be less than the table value of 1.96. The null hypothesis is so accepted. The study's findings showed that student teacher educators' use of cloud computing services does not significantly differ based on their gender or other characteristics with their dimensions (Table 1).

At a five percent significance level, the predicted "t"-value, which is based on the preceding table of dimension-wise cloud computing utilisation, is smaller than the table value (1.96). It is concluded that there is no discernible gender difference in the ways that student teacher educators view cloud computing.

From the age with their dimensions wise analyses inferred that the calculated 't' values 0.19 (Awareness), 0.50 (Importance), 0.77 (Usability), 0.58 (Complexity) and 0.48 (Accessibility) are less than the 1.96 table value at the significance level of 0.05 percent. The null hypothesis is so accepted. According to the study's findings, student teacher educators' use of cloud computing services does not significantly differ based on their age with their dimensions (Table 2).

At a 5 percent level of significance, the determined "t"-value, which is based on the provided table of cloud computing utilisation per dimension, is smaller than the table value (1.96). Based on age, it is concluded that there are no barely any differences in the ways that student teacher educators view cloud computing.

From the major group based on their dimensions wise analyses inferred that the calculated 't' values 0.22 (Awareness), 1.15 (Importance), 1.26 (Usability), and 0.04 (Accessibility) are below the 1.96 table value at the 0.05 percent significance level. The null hypothesis is so accepted. According to the study's findings, student teacher educators do not significantly differ in how they use cloud computing services. with respect to their major group with their dimensions such as awareness, importance, usability and accessibility (Table 3).

Table 1: Mean, Standard Deviation, and 't' value of Utilization of Cloud Computing among student teacher educators (Gender–wise)

Dimensions	*Male*		*Female* '		*t' -value*	*Level of*
	Mean	*SD*	*Mean*	*SD*		*significance*
Awareness	43.49	4.49	43.97	4.0	0.72	NS
Importance	33.50	4.08	35.26	3.95	0.39	NS
Usability	42.37	5.54	43.10	4.79	0.88	NS
Complexity	53.68	5.39	53.12	5.29	0.67	NS
Accessibility	35.07	5.23	34.95	4.44	0.15	NS

df=298 (NS=No significance at 0.05 level).

Table 2: Mean, Standard Deviation, and 't' value of Utilization of Cloud Computing among student teacher educators (Age–wise)

Dimensions	*Below 35*		*Above 35* '		*t' -value*	*Level of*
	Mean	*SD*	*Mean*	*SD*		*significance*
Awareness	43.88	3.80	43.89	5.21	0.19	NS
Importance	31.22	4.01	35.50	3.76	0.50	NS
Usability	42.82	4.87	43.39	5.05	0.77	NS
Complexity	53.30	5.14	52.82	5.89	0.58	NS
Accessibility	35.01	4.53	34.67	4.82	0.48	NS

df=298 (NS=No significance at 0.05 level).

Table 3: Mean, Standard Deviation, and 't' value of utilization of cloud computing among teacher student educators (Subjects in Group–wise)

Dimensions	*Arts*		*Science*	*'*	*t' -value*	*Level of*
	Mean	*SD*	*Mean*	*SD*		*significance*
Awareness	43.94	3.68	43.82	4.68	0.22	NS
Importance	35.09	3.92	35.64	4.03	1.15	NS
Usability	42.69	4.72	43.45	5.23	1.26	NS
Complexity	52.72	4.95	54.02	5.74	2.08	S
Accessibility	34.98	4.38	34.95	4.88	0.04	NS

df=298 (NS=No significant, S- significant at 0.05 level).

Additionally, the major group wise analysis inferred that at the 0.05 percent level of significance, the estimated "t" value of 2.08 Complexity is higher than the table value of 1.96.

Though the utilization of cloud computing services in its dimension complexity of science-based student teacher educators had more utilization of cloud computing services than the arts-based group. Consequently, the null hypothesis is not accepted. Therefore, the result of the study concluded that there is a significant difference in utilization of cloud computing services among student teacher educators based on their dimension complexity.

From the locality with their dimensions wise analyses inferred that the calculated 't' values 0.67 (Awareness), 0.53 (Importance), and 0.48 (Accessibility) are less than the 1.96 table value at the 0.05 percent significance level. Thus, the null hypothesis has been accepted based on the following dimensions such as awareness, importance and usability of utilization of cloud computing services among student teacher educators. The result of the research indicates that there is statistically significant difference in utilization of cloud computing services among student teacher educators with respect to their locality with their dimensions such as awareness, importance and accessibility. The 't' values of the remaining dimensions such as usability (2.01) and complexity (2.52) are above the table value 1.96 at 0.05 percent significance level. Consequently, there is no acceptance of the null hypothesis. The study's findings indicated that there is a significant difference in utilization of cloud computing services among student teacher educators with respect to their locality with their following dimensions such as usability and complexity (Table 4).

It is inferred that the mean score of the student teacher educators belonging to rural locations had higher complexity in the utilization of cloud computing services than they are in urban locations based on locality. It is inferred that the mean score of the student teacher educators belonging to urban locations had higher usability in the utilization of cloud computing services than they are in rural locations based on locality.

From the computer knowledge with their dimensions wise analyses inferred that the calculated 't' values 0.62 (Importance), 0.69 (usability), 1.32 (complexity) and 1.62 (Accessibility) are lower than the 1.96 table value at the significance level of 0.05 percent. Consequently, the null hypothesis is so accepted. The study's findings showed that there

Table 4: Mean, Standard Deviation, and 't' value of utilization of cloud computing among student teacher educators (Locality–wise)

Dimensions	*Rural*		*Urban*	*'*	*t' -value*	*Level of*
	Mean	*SD*	*Mean*	*SD*		*significance*
Awareness	44.00	3.80	43.57	4.89	0.67	NS
Importance	35.38	3.78	35.06	4.51	0.53	NS
Usability	43.24	4.83	42.76	5.14	2.01	S
Complexity	53.65	5.26	51.87	5.23	2.52	S
Accessibility	35.04	4.71	34.76	4.12	0.48	NS

df=298 (NS=No significance, S- significance at 0.05 level).

isn't a significant difference. in utilization of cloud computing services among student teacher educators with respect to their computer knowledge with their following dimensions such as based on the following dimensions such as importance, usability, complexity and accessibility (Table 5).

Furthermore, at the 0.05 percent level of significance, the "t" values of the remaining dimensions such as awareness (4.40) are greater than the table value 1.96. As a result, the null hypothesis not accepted. The results of the study indicated a significant difference in utilization of cloud computing services among student teacher educators with respect to their awareness dimension in computer knowledge.

It is inferred that the mean score of the student teacher educators who have a computer at home had higher awareness of cloud computing services than those are don't have a computer at home. The calculated 't'-value is based on the Table 5 of overall utilization of cloud computing among student teacher educators (0.18), that is less than the tabulated value (1.96) at a 5 percent level of significanceIt is concluded that there are no significant difference in student teacher educators in their overall utilization of cloud computing with respect to computer at home.

From Table 6 indicated that the overall demographic variables wise analysis inferred that the calculated 't' values 0.18 (gender), 0.06 (Age), 1.69 (Locality of student teachers) and 1.35 (Major groups) are less than the value in the table 1.96 at the significance level of 0.05 percent consequently, the hypothesis is accepted based on the following demographic variables such as gender, age, locality of student teachers and major group wise analyses of utilization of cloud computing services among student teachers. The study's findings indicated that there was no significant difference in utilization of cloud computing services among student teachers with respect to their following demographic variables such as gender, age, locality of student teachers and major group.

Additionally, from the Table 6 showed that the computer knowledge wise analysis noticed that the calculated 't' value 2.25 is greater than the table value 1.96 at 0.05 percent level of significance. Consequently, the null hypothesis is not accepted based on the computer knowledge wise analysis. The result of the study revealed that there is a

Table 5: Mean, Standard Deviation, and 't' value value of utilization of cloud computing among student teacher educators (Computer at Home-wise)

Dimensions	*Yes*		*No*	*'*	*t' -value*	*Level of*
	Mean	*SD*	*Mean*	*SD*		*significance*
Awareness	46..10	2.07	43.73	4.15	4.40	S
Importance	35.89	4.40	35.25	3.94	0.62	NS
Usability	43.47	3.11	42.93	5.03	0.69	NS
Complexity	54.57	4.56	53.13	5.35	1.32	NS
Accessibility	36.36	3.86	34.86	4.60	1.62	NS

df=298 (NS=No significance, S- significance at 0.05 level).

Table 6: Mean, Standard Deviation, and 't' value of overall utilization of cloud computing among student teacher educators

Variables		*Mean*	*SD*	*'t'-value*	*Level of significance*
Gender	Male	210.13	18.58	0.18	NS
	Female	210.58	16.59		
Age	Below 35	210.47	16.60	0.06	NS
	Above 35	210.29	18.27		
Locality	Rural	211.55	16.30	1.69	NS
	Urban	207.45	18.16		
Group	Arts	209.40	14.71	1.35	NS
	Science	212.34	19.89		
Computer at Home	Yes	216.42	11.40	2.25	S
	No	210.09	17.16		

df=298 (NS=No significance, S- significance at 0.05 level)

significant difference in utilization of cloud computing services among student teacher educator with respect to their computer knowledge.

At the five percent significance level, the computed "t"-value, which is based on Table 6's overall cloud computing utilization among student teacher educators by age (0.06), is smaller than the table value (1.96). It is concluded that teacher educators' overall use of cloud computing does not differ much from one another. At the five percent significance level, the estimated "t"-value of the group-wise overall cloud computing utilisation among student teacher educators (1.35), is lower than the table value (1.96). It is concluded that there are not any significant variations in the way that student teacher educators utilize cloud computing in overall among student teacher educators in their overall utilization of cloud computing. The calculated 't' value of overall utilization of cloud computing (2.25) is higher than the table value (1.96) at a 5 percent level of significance. Hence it is inferred that the student teacher educators who have a personal computer at their home had better utilization of cloud computing than those student teacher educators who do not have a personal computer at home.

DISCUSSION

The present research is conducted the study on utilization of cloud computing among teacher educators. The results reveal that overall utilization of cloud computing services is moderate among teacher educators. In other words, there was a significant difference in utilization of cloud computing among teacher educators for their computer at home, other demographic variables showed no difference exists. The current study's findings line up with the findings from numerous previous research studies. Ghnimi (2024) reported that there was no significant difference in cloud computing technologies among higher education students with respect to their gender and locality. According to Nasrin (2023), the adoption of cloud computing data centres was influenced by eight of ten factors: relative advantage, complexity, compatibility, top management support, policy and standardisation, competitive pressure, outage, and security. In the field of cloud computing utilisation, this study provided support for the present investigation. According to the findings of a study by Talmizie (2022), the learning environment and security considerations are favourable indicators of the propensity to use cloud computing. This study slightly overlaps with the present study that the use of cloud computing is significantly difference with awareness dimensions. In previous studies, the researchers Ampera et al. (2021) conducted a study on the adoption of a cloud computing system in an engineering education study program to support educational system development with engineering students. in relation to the results, cloud computing services offer several benefits, one of which is enhancing the effectiveness and efficiency of cloud computing-based technologies in the process of teaching and learning. as per a study by Al-Hajri et al. (2021), the COVID-19 pandemic had a significant effect on the adoption of cloud computing systems in Oman's higher education sector. (Yang 2024). The purpose of the article is to elaborate on the important part that the "cloud-based study tour" plays in fostering high-quality, regionally balanced practical education through the use of digital technology and teamwork during the curriculum building process. Chen's (2025) study's result showed that the significant difference in pre-test and posttest design in self-efficacy and the overall outcomes of learning. The suggested of the study to enhancing cloud computing in education by bridging theory and hands on training. In final stages, educating learners prepared to meet the demands of the digital era. According to Arndt et al. (2024), the findings examined the need for more thorough and varied critical thinking tests in K–12 computing education that include various educational stages as well as computing education perspectives. Sugahara et al. (2022) investigated how high school students' perceptions of accounting play a part in identifying important factors influencing their acceptance. New information about the use of cloud accounting as a new technology was given to the study. strategies to provide pupils with relevant and efficient options. There should be more chances to utilise the latest technologies and get practical experience in the accounting curriculum. Wang (2024) investigated how cloud e-learning might help with the high expense and complexity of traditional learning approaches for the improved higher education learning process. The influence of the actual use of the cloud e-learning module was experienced by analysing the pre-test results and the

academic achievement of the students. Additionally, students' learning performance in theoretical courses improved when cloud e-learning was used. According to the study, cloud e-learning helped teachers and ICT professionals make well-informed choices on which ICT infrastructure to deploy to facilitate e-learning in higher education.

CONCLUSION

The results of this research indicate that gender, age, locality and major groups do not significantly influence the overall utilization of cloud computing services among teacher educators. However, the presence of a computer at home emerged as a significant contributing factor. This underscores the importance of access to technology infrastructure in facilitating utilising and integrating cloud computing services. Further research could explore the specific reasons behind this association and its implications for enhancing technology adoption in educational settings. The teacher educators who have their own computers at home had better awareness and utility in cloud computing than those teacher educators who do not have a computer at home. Finally, teacher educators have a low attitude toward cloud computing because there may be a chance for low awareness of the knowledge of cloud computing services. Cloud computing can keep records of students' interaction with the episode, but the teacher educators need to interpret the record's meaning. It will be the teacher educator's responsibility to work with the student teachers and the cloud system to help student teachers maintain a reasonable learning pace.

RECOMMENDATIONS

Regarding the findings of the current study, It is suggested that all student teacher educators have access to computers at home by implementing initiatives such as subsidized computer programs, loaner programs, or partnerships with technology companies to provide affordable access to devices. Training and professional development will be given to student teacher educators to enhance and offer comprehensive training and programs for professional development that concentrate on cloud computing services. In addition to covering the technical aspects of using cloud platforms, these programs should emphasise the educational benefits and real-world applications in teaching and learning. They should also promote the inclusion of cloud computing services in teacher education programs' curricula and include practical exercises, projects, and assignments that introduce teachers to the capabilities and advantages of cloud-based tools and platforms. They should also advocate for policies and infrastructure investments that encourage reliable internet connectivity along with equitable access to technologies., especially in underserved communities, work with policymakers, educational institutions and technology providers to address barriers to adoption and ensure a supportive environment for utilizing cloud computing services, as by implementing these recommendations, institutions and organizations can empower teacher educators to leverage cloud computing services effectively in their professional practice, ultimately enhancing the quality of education delivery and preparing future generations of educators for the digital age.

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