

IMPLEMENTATION OF A CLOUD-BASED E-LEARNING SYSTEM

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ABSTRACT

Education contributes to the nation's economic success. Education has the potential to eradicate or reduce a variety of national challenges such as poverty, illiteracy, a substandard education system, a narrow foreign viewpoint, insufficient money per capita, and many more that impede the country's prosperity. The current study was conducted on colleges and universities in Rohtak and Haryana that provide undergraduate and postgraduate studies. The main data was acquired via a questionnaire that included the respondent's personal information, questions about their understanding and use of cloud computing, and 37 factors relevant to the study aims. The sample was selected using a random sampling procedure. The PSS Package was being run to gather and analyses survey data. The essential success and barrier variables were determined by "applying a factor analysis tool to the data collected through the questionnaire". After conducting factor analysis, it was discovered that 07 elements emerged as critical determinants influencing the adoption of CBeLS in higher education, which ultimately served as critical Performance Indicators. These variables are: Technical Usefulness (TU); Data Security Risk (DSR); Educational and Institutional Use (EIU); Cost-Saving and Quality Standard (CSQ); Compatibility with Traditional Classroom (CTC); Cost of Usage and Content Unavailability (CUU); and Personal Barriers (PB). These seven criteria were divided into three categories: factors contributing to technological drivers, factors contributing to environmental drivers, and factors contributing to organisational drivers of CBeLS at college or university. The current research investigates the relationship between CBeLS variables, attitude towards CBeLS, and intention to apply CBeLS using Structural Equation Modelling (SEM) in AMOS 20.0. A conceptual model was then presented, which has implications for an institution's teaching-learning environment and infrastructure.

KEYWORDS E-Learning, E-Learning Systems, Conventional E-Learning Systems, Cloud-Based E-Learning Systems,

INTRODUCTION

Education is gaining speed because to technological advancements, which are opening up a plethora of new opportunities for both students and teachers. Learning curves are shifting in a favourable direction because to modern teaching-learning methods, which foster more collaborative relationships between educators and their students. With the introduction of IT technology, the pace of teaching and learning has been altered on a worldwide scale via the notion of adaptable learning. Learning interests and requirements vary from student to student. Adaptive learning is a new way of teaching and learning that focusses on meeting the individual requirements of each learner. It adapts the difficulty of a task or assignment in real time based on how well the student is doing. The premise of adaptive learning is to modify the content and delivery of a course based on

each student's individual requirements and level of achievement. This cannot be achieved in a more conventional classroom setting.

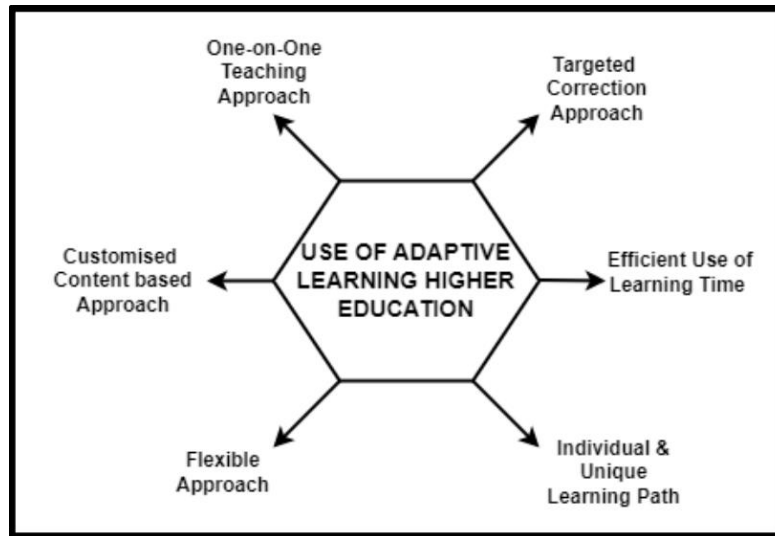


Figure 1: Use of Adaptive Learning

Definition and Overview of Cloud-Based VR

By combining two game-changing technologies, cloud-based virtual reality (VR) has the potential to radically alter the way people learn. Cloud-Based VR, at its heart, is the integration of virtual reality systems with cloud computing services; this opens up new possibilities for scalable, collaborative, and immersive learning for both educators and students. Virtual reality (VR) that is "cloud-based" means that users may access a wealth of educational materials whenever they want by storing, processing, and delivering VR information over the cloud. This eliminates the need for expensive local gear. The development of virtual reality (VR) in the classroom provides important context for comprehending the rise of VR in the cloud. The adventure starts with the first forays into virtual reality (VR) education, mostly in niche areas like medical and military simulations. Virtual reality (VR) has become more accessible as a result of improvements in hardware, software, and accessibility, which has increased the likelihood of its broad use in classrooms. In light of this background, it is easy to see how cloud integration may revolutionize virtual reality by making it more widely available, inexpensive, and scalable.

THE CLOUD'S IMPORTANCE IN THE CLASSROOM

It is impossible to exaggerate the importance of cloud-based VR in classrooms. Problems with maintaining and updating gear, a lack of available resources, and a general aversion to cutting-edge technology are common obstacles to more conventional approaches to teaching. Educators and learners may access virtual reality experiences via lightweight devices using virtual reality (VR) on the cloud, which gets around these restrictions by offloading data processing and storage to remote servers. Virtual reality (VR) is becoming more accessible in the classroom, allowing schools to reach more students regardless of their location or budget. Improved group work and student-teacher dialogue are two further areas where cloud-based virtual reality is having a revolutionary effect in the classroom. Incorporating cloud computing, a multitude of users may engage in shared virtual worlds at the same time, cultivating collaborative learning opportunities that go beyond physical

limitations. With students and teachers spread all over the world, this sense of community becomes even more important in today's globally integrated classrooms.

Artificial Intelligence and Education (AI&ED):

Among the many ways in which artificial intelligence (AI) is influencing classroom instruction are the phrases "learning with AI," "learning about AI," and "preparing for AI." A different term for AI-powered classrooms is "artificial intelligence for education."

Artificial Intelligence in Education (AIED):

A field of research that began in the 1980s and is devoted to artificial intelligence learning tools (also referred to as learning with AI).

LITERATURE REVIEW

Singh (2023) The rapidly expanding area of cloud AI is devoted to the development of smart solutions for an infinite number of sectors. With the help of AI cloud computing, businesses have access to statistical and machine learning technologies that can do complex computations, allowing them to create more interactive apps. When it comes to artificial intelligence (AI) cloud computing, the main points are the following: making smart apps, assisting businesses with Big Data, implementing sophisticated algorithmic features in applications, and forecasting and planning for future development. All of this has a significant impact on longevity and profitability. The advantages and development of AI in cloud services are discussed in this article. Artificial intelligence and cloud computing have unquestionably improved many lives. Every day, people utilise digital assistants such as Alexa, Google Home, and Siri from Amazon. These helpers make it possible to use voice commands to do things like purchase products, adjust the temperature in a smart house, or play music on a connected speaker. Present-day cloud computing systems reap the benefits of AI methods. Software as a service (SaaS) companies include artificial intelligence (AI) into their bigger software packages to offer consumers additional features.

Nur Fitria, Tira. (2021). This research explores the use of artificial intelligence (AI) in the classroom, particularly as a tool for instruction. The goal of AI research is to create machines that can mimic human intelligence in terms of behavior and thought processes. With advancements in science and technology, technological gadgets will take over many of the tasks now performed by instructors, such as attendance, correcting student work, administering quizzes and examinations, explaining concepts, and creating administrative reports. To produce a golden generation that surpasses machines in intellect, character, and quality, educators may conserve energy and devote more time to non-systemic tasks.

Annuš, Norbert. (2024). The digitization of educational systems has led to the development of innovative tools, such as adaptive-personalized learning programs, powered by artificial intelligence (AI). These tools can streamline procedures, enhance teacher-student communication, and improve subject comprehension. However, students play a crucial role in education, and their interest in AI-based instructional software is crucial. A study surveyed 500 students from various educational institutions, including Generation Z and Alpha, to understand their understanding of AI and their receptivity to AI-based software. The majority of students were receptive to AI-based software, demonstrating their eagerness to use it. The study suggests that educators should incorporate AI programs into their pedagogical practice and develop new approaches to education. The study provides fifteen software solutions for education, promoting varied and personalized learning, making the teaching process easier and faster, and featuring smart features. The study's goal is to

introduce readers to the possibilities of educational software and encourage schools and educators to regularly use it.

Krstić (2022) These days, almost every single thing people do involves some kind of interaction with computers. There are new opportunities, threats, and concerns that arise when cutting-edge technology like artificial intelligence (AI) are used in the classroom. Computer systems may now provide individualized assistance, support, or feedback to educators and students via the use of artificial intelligence, which mimics human intellect in generating conclusions or predictions. This paper's goals are to (1) determine how AI has altered the educational landscape, (2) describe many AI-based educational applications, and (3) emphasise the advantages that these applications are thought to provide.

Göçen (2020) Numerous experts in the subject of education anticipate a shift in the function of schools, administrators, and instructors as a result of the proliferation of research into the use of artificial intelligence (AI) in the classroom. With that said, the study's overarching goal is to investigate the potential outcomes of AI's introduction to the classroom and the insights it may provide into the educational landscape of the future. A phenomenological study, a kind of qualitative research, was used to compile and analyses the responses of people from many walks of life. New goods, advantages, and challenges will be introduced to schools and instructors by the entrance of AI in education, according to the research. The results highlight several recommendations for AI application and potential issue avoidance. While most people have a favourable impression of AI, educators and researchers have pointed out several negative aspects, particularly as they relate to the field's potential impact on the classroom in the future. While engineers see AI as a tool to improve education for everyone, lawyers and jurists are more concerned with the legal aspects of AI in the classroom and potential future issues.

CLOUD COMPUTING

In computing, "the cloud" refers to a collection of services that include servers, storage, databases, networking, software, analytics, and intelligence on the cloud. Its stated goals include the provision of adaptive resources, scale economies, and quick innovation.

AI and Cloud Computing

AI powered by the cloud, you can store and analyses data in an advanced fashion, and machine learning technologies can learn and enhance operations all the time.

The concept of artificial intelligence (AI) originated in science fiction, as did many previous scientific breakthroughs. Artificial intelligence (AI) emerged as a popular concept when a number of mathematical and philosophical ideas reduced human mind to the mechanical transformation of many symbols.

Businesses may improve their data processing skills and productivity with the aid of cloud computing, which provides state-of-the-art computer resources via the internet. Artificial intelligence (AI) is the way to use such resources to increase abilities. AI internet-based service executes ML tasks in modern cloud environments without a hitch. Thanks to this setup, we can control our favorite music with the sound of our voices, have access to a smart thermostat, and use Google Home. Systems that use Using cloud-based artificial intelligence (AI) might provide more flexible and cost-effective strategic insights. For example, SAAS developers may expand their consumers' possibilities by using AI approaches.

Benefits of AI Cloud Computing in Education

Data processing and storage are both optimized with the use of cloud computing and AI, whereas ML technologies enhance operational performance via continuous learning.

Saved money overall: The education industry may benefit from AI Cloud Computing and IAAS platforms' state-of-the-art capabilities without the hefty costs of traditional data centres and IT infrastructure.

- **Smart automation and improved productivity:**

Reduced staff stress and more resources available for higher-priority tasks are two benefits of AI's ability to automate complex data processing and analysis tasks.

Challenges of AI Cloud Computing

Network connectivity:

Reliable network access is essential for cloud-based machine learning applications. Connectivity issues may significantly impact operations that depend on machine learning algorithms. Further processing in the cloud also requires the data to travel a distance, which adds more processing time. Timely answers and the short procedures needed for resolution are affected by the substantial time delay of sending data to the cloud.

Data privacy:

An important concern with AI cloud computing ensures the security of individual records. Machine learning sensors collect data from a wide range of users before sending it for analysis. Computing in the cloud for use on the go lacks proper security standards, which may lead to data breaches and other security issues.

“GUIDANCE” AI APPROACHES

A "road map" Artificial intelligence (AI) is really a catchall term for algorithms that help both students and instructors make choices. In addition to assisting with the decision-making process and expanding access to educational opportunities, they provide data-based counsel. Even if they don't directly relate to education, they may nonetheless have made a big splash in the industry. Take "guidance" AI as an example; it might lead to examine data in order to link low-income kids with educational options, therefore reducing educational inequality. Programs like this are shown below.

Teacher Recommendation System

A system that uses AI to propose professors and students for online courses was developed (Chen et al., 2021). The use of recommendation algorithms is crucial in online one-on-one classes for the purpose of pairing students with instructors. To reduce schedule and social difficulties, it is important for teachers and pupils to be well matched. Reviews aren't always trustworthy since ratings and reviews left by former students may be both loud and inaccurate.

THE APPROACH OF ELEARNING USING CLOUD SERVICES

We call it the Learning Cloud, and our concept, CeL, is based on the idea that anything— data stored on the cloud, whether organised or not, might potentially serve as a teaching tool helps people learn. Therefore, it is important to define and demonstrate the learning cloud as an online repository housing a range of learning

materials (e.g., text, video, audio, photos, data, exams, etc.) made accessible by a number of different providers. In our concept, cloud computing and related services play a pivotal role. It is our intention to learn more about the models that employ cloud computing and the ways it is used to online education.

In this chapter, we will look upon resources as they pertain to eLearning techniques that use Cloud services. Several potential service models for eLearning services, such as Learning as a Service (LaaS) and Education as a Service (EaaS), will be outlined here. In order to demonstrate the connection between our idea and cloud computing, we want to provide an abstract architecture.

The Learning Cloud

Everything kept in a multitude of resources that make up the Learning Cloud housed in the Cloud, has the ability to be used for educational objectives. We started by looking at the current status concerning eLearning and the use of cloud services for the purpose of integrating learning content in a relevant manner, pair them flexibly, and utilise them alone or in combination in different situations.

Cloud deployment and service models

There are several cloud deployment types that consumers might identify in cloud computing situations. The four most common models used by cloud providers nowadays are:

- (i) public cloud,
- (ii) private cloud,
- (iii) community cloud, and
- (iv) hybrid cloud.

Cloud in eLearning

As an additional piece of evidence for the practicality of cloud computing for business operations, particularly in the educational sector, we will outline some of the advantages of this model, drawing attention to the growing number of organisations that are utilizing it to better serve their students.

DRAWBACKS OF AI IMPLEMENTING AI IN EDUCATION

Artificial intelligence (AI) has great promise for enhancing classroom instruction, but it faces several obstacles that prevent it from doing so in a secure and reliable manner. Privacy, ethics, expense, and the capacity to explain or rely on reliable data are some of its constraints. The implementation of AI may become less feasible, risky, or undesirable due to these constraints, which might cause the technology to be too expensive for its benefits or cause damage by compromising privacy.

Lack of Human Interaction

When AI starts doing things like grading and teaching that humans do, we risk losing the benefits of human interaction. Although AI has the potential to improve feedback and instruction via personalization, it still falls short of fully replacing human instructors and pupils. When compared to human educators, AI would struggle

to tailor comments and lessons to each student. Now more than ever, educators can gauge their students' comprehension by watching their facial expressions and body language

Privacy, Data Security, and Ethics Considerations

There may be worries about data usage when AI is utilised in classrooms. Artificial intelligence (AI) is a very young and expanding industry with little regulatory experience. In 2023, the European Union enacted the AI Act, was the first set of legislation pertaining to artificial intelligence. The inclusion of AI might face opposition from many individuals who are opposed to data gathering and sale. As a consequence, it will be necessary to pay specialists to create appropriate rules to safeguard AI users, which will add to the expenses. The typical income for an entry-level cybersecurity analyst is \$77.592 thousand dollars.

Lack of Explainability

AI has a problem: it's not easy to explain. Because AI algorithms are so sophisticated, engineers don't always understand how the system arrives at its findings, even when they are aware of the data input and the results. Some have said that AI is like a black box since we don't really know how it works (Chowdhury et al., 2012). This may make AI challenging to oversee, especially if it encourages prejudices that must be addressed.

Cost

Artificial intelligence (AI) might be prohibitively costly for schools due to the substantial computer resources and time it takes. Artificial intelligence programs need high-quality computer equipment and a substantial financial commitment.

EDUCATIONAL PRINCIPLES & DIRECTION

If artificial intelligence (AI) is to successfully improve education, it must be grounded in educational ideas derived from both teachers' and researchers' work in the field. According to Holstein et al. (2019), human-centered design is often the reason why AI-human relationships fail. For instance, AI won't be helpful if the instructor can't make sense of the data it's providing. Developing AI to supplement human talents is crucial, since the introduction of AI into education systems does not guarantee an improvement in education. Developers of artificial intelligence should collaborate with direct practitioners, such as educators, to foster human-AI synergy (Holstein et al., 2019).

Learning abilities that will be relevant far into the future should also be the focus of AI-enabled classrooms. There are those who are worried that AI and robots will outnumber humans in the workforce. The workforce of the future must be inventive and creative if it is to survive (Rampersad, 2020). The significance of human-level cognitive abilities like imagination and analysis will grow as AI improves at imitating human behaviour. The importance of critical thinking is not adequately emphasized in curriculum, even though the majority of individuals recognise its significance (Spector et al., 2019). Because artificial intelligence (AI) is rapidly developing and replacing human workers in many occupations, it is crucial that students learn transferable skills like critical thinking and creativity.

CONCLUSION

With the rise of cloud computing—a new paradigm that facilitates technical advancement and allows dispersed applications across different geographies—and its on-demand, metered access to computing resources

(Process, Memory, Storage, etc.)—online learning is now the direction technology is heading. Hence, a cloud computing environment that supports online learning was examined in this work. Emphasis is placed on the possibility of distant participation in both education and work. An urgent requirement for thorough integration of several aspects, including hardware, software, security, and practical implementations, is shown by the dependence on literature studies. Information security is of the utmost importance, especially when dealing with sensitive data such as student grades, even if public cloud computing provides cost savings. Although cloud computing has had a significant impact on e-learning, there are still many obstacles that must be overcome in order to create a truly inclusive learning environment. In terms of design, software, performance, and the possibilities of various cloud computing service models, this study's main conclusion highlights the significant role of cloud computing in improving the integration and efficacy of e-learning. In addition, the study provides suggestions for future studies and readers.

REFERENCES

1. Göçen, ahmet & aydemir, fatih. (2020). Artificial intelligence in education and schools. Research on education and media. 12. 13-21. 10.2478/rem-2020-0003.
2. Krstić, lazar & aleksić, veljko & krstić, marija. (2022). Artificial intelligence in education: a review. 223-228. 10.46793/tie22.223k.
3. Annuš, norbert. (2024). Educational software and artificial intelligence: students' experiences and innovative solutions. Information technologies and learning tools. 101. 200-226. 10.33407/itlt. V101i3.5479.
4. Nur fitria, tira. (2021). Artificial intelligence (ai) in education: using ai tools for teaching and learning process.
5. Singh, rinkey & bhatia, raino. (2023). Ai cloud computing in education. 10.13140/rg.2.2.24574.97602.
6. Jingjing Lin (2023) Chatgpt and moodle walk into a bar: A demonstration of ai's mind-blowing impact on e-learning. SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4393445.
7. Ramazan Yilmaz, Fatma Gizem Karaoglan Yilmaz (2023) The effect of generative artificial intelligence (ai)-based tool use on students' computational thinking skills, programming selfefficacy and motivation. Computers and Education: Artificial Intelligence 4.
8. Adele Smolansky, Andrew Cram, Corina Radulescu, Sandris Zeivots, Elaine Huber, et al. (2023) Educator and student perspectives on the impact of generative ai on assessments in higher education. Proceedings of the tenth ACM conference on Learning @ Scale 378-382.
9. Mohammed Jaboob, Manar Hazaimah, Abdullah M AlAnsi (2024) Integration of generative ai techniques and applications in student behavior and cognitive achievement in arab higher education. International Journal of Human– Computer Interaction 1-14.
10. Tat Putjorn, Pruet Putjorn (2023) Augmented imagination: Exploring generative ai from the perspectives of young learners. 15th International Conference on Information Technology and Electrical Engineering (ICITEE) 353-358.