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An Approach of Continued Involvement and Continued Development Using Cloud Computing for University-Industry Collaboration

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Abstract: ***Education is strange for any country's growth. Nowadays technology is growing rapidly. Technology plays a very important role in every domain of industry, especially in higher education where there is a need to improve the quality of education. Continuing updating in technology is essential to adopt by education institutions. Education 4.0 and 5.0 are focused on providing value-based, skill-based education according to the needs of the industry. Cloud computing helps to make a bridge between university and industry. Cloud computing has such a kind of characteristic, service model, and deployment model which helps to continued involvement and development (CI/CD) to UI. Our research discussed the role of continued involvement and continued development by the university and industry using cloud computing.***

Keywords: University-Industry Collaboration, Cloud Computing, Knowledge Transfer, Continued Involvement (CI), Continued Development (CD). Education 4.0, Education 5.0

I. INTRODUCTION

Education and technology have the power to create value in society. Nowadays, technologies play a key role in making a value and skill-based education. Education 4. O is associated with the fourth industry and education revolution. It transforms the way of education from traditional to future using the fifth or cutting-edge technologies like Cloud computing, AI, Robotics, etc

Education 4. O has several crucial features for this transformation of education. One of the essential features of Education 4. O is to prepare students for industry-ready. India Now moves to focus on skill and practical-based education. There is a need for Industry.

Education 5. O has also adopted the features of Education 4. O but in addition, it focuses on collaborative work, making better communal relations, and innovation, etc. [10]. In Education 4. O and Education 5. O both are more focused on students, faculty, implementation of technology in education, and collaboration between industry and academia. Information Technology helps to transform the traditional education system to feature education.

Information Technology is fleetness update and it plays a very important role in every domain and among them education is one of them. India is the largest country in the world in terms of population demographics as well as higher education centers [3]. But in terms of global employability, India is still struggling [4]. For that there are many reasons like a lack of skill-based education, faculty not being able to make themselves up to date as per real-time needs of industry, course and curriculum not up to the mark, lack of industry engagement, and many more. These issues arise because of less industry involvement and linkage with academia. Through Cloud computing technology, academia and industry collaboration can happen on a common platform for the betterment of the university, students, faculty, researcher, and even society as well.

Cloud Computing is a technology that provides the power of computing over the internet. Cloud Computing provides a concept of deployment and service models like IaaS, PaaS, and SaaS and public Cloud, private Cloud, and hybrid Cloud. Cloud Technology can provide Virtual engagement between Industry and Academia using the concept of CI/CD.

Continued Involvement (CI) helps to engage the Academia and Industry to improve the quality of education, make better availability of industry-based resources, facilitate easy interaction with industry, and vice versa. It also helps to improve the quality of research based on real-time problems which need industry and society. CI also supports faculty, students, and even in the administration of academia. Continued Development (CD) helps students to work in a real-time development environment under the guidance of academia and industry..

Figure 1, define that UIC helps to develop the content or course to explore, evaluate, and upskill the students to make students industry ready as an outcome of continued involvement and continued development.

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In this paper, we are focusing on cloud computing technology. Cloud computing has several features that help establish a bridge between Academia and Industry in favor of continued involvement and continued development (CI/CD) concept.

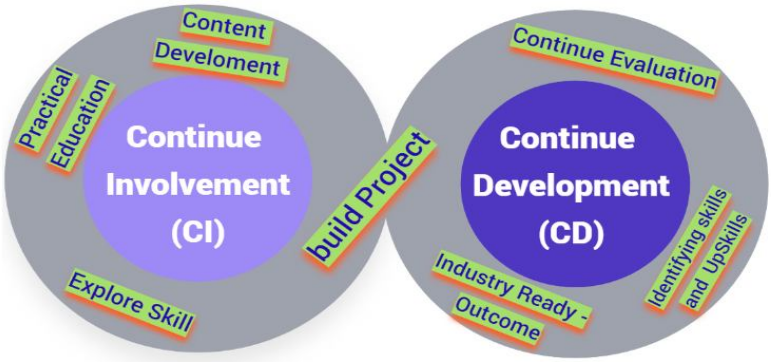


Figure 1 - Industry Ready Student - CI/CD Approach

II. LITERATURE REVIEW

There are several studies already done related to University or Academia and Industry Linkage or Collaboration. Researchers highlight in the empirical study that the adoption of cloud computing in higher education provides resources not in the form of materials but also software and hardware at a lower cost to students, faculty, and institutions as well [5]. According to [6] University–Industry linkage helps the student to learn according to industry needs and the university can ensure students for better employment. So there is a need to understand the linkage between Indian universities and industry. So makes such a cloud base model for enabling/facilitating a durable relationship between universities and industry for the betterment of students, faculty, and society. Article [7] defines that there is a significant need to use UI collaboration which is more favorable to all stockholders like industry, students, faculty, researcher, and society for obtaining the benefit of it. It also mentioned that UIC helps in receiving research funds from the government

Researchers [8] describe that UIC helps to improve adaptability for better research and development. Research-oriented universities are actively upgrading technology, building stronger ties with the private sector, and responding to national initiatives to bridge the gap [9]. UIC includes a hybrid mode approach of internship, developing new and innovative teaching methodologies which help to make a success of this collaboration and make a value base and skill base program [11]. Researchers point out the issue of research efficiency and it is also imposed on the use of cloud technology and service to increase efficiency and improve the research activity [14]. Co-producing knowledge and fostering dialogic relationships in the evolving area of cloud service brokerage is of significant interest to academia and industry [16].

Collaborators from universities or research institutes play a vital role in enhancing their understanding of the challenges faced by companies. Problem-solving requires the joint effort of knowledge creators and those who provide capital and resources [12]. According to M. O'Dwyer et al, this collaboration promoted mutual understanding, facilitating knowledge and idea exchange that helped academics learn to share resources and collaborate with industry [13]. By ignoring individual perceptions of database use, and focusing only on technical infrastructure for U-I collaboration [15]. Cloud provides the best-in-class IT infrastructure with immense features

III. CLOUD COMPUTING

Cloud computing is a technology that is accessible over the internet. It gives immense features by providing on-demand resources, and scalability of resources like computing, storage, network, services, etc. over the internet. Cloud facilitates to use of the service for application (SaaS), platform (PaaS), and infrastructure (IaaS) for deployment on public, private, and hybrid clouds. Characteristics of Cloud Computing for UIC are.

1) *Easy to scale and Elasticity:* Scalability refers to handling the increased and decreased workload. As UIC is concerned, it can handle growth by expanding infrastructure, research capacity, funding, and administrative support. It involves accommodating larger projects, increased data volumes, and more participants. Elasticity refers to allocating and adopting the resources dynamically. It's come with the feature of flexible allocation of resources, scalability, and agility.

2) *Cost Efficiency:* By the implementation of the pay-as-you-go model of cloud computing, UIC can reduce the cost of infrastructure. It can also reduce maintenance and managing costs and also get continued updates of resources.
3) *High Availability and Durability***:** This feature provides the guarantee of continued operation, maintains data integrity, and also protects from any kind of failure. UIC can continue to communicate without getting any threat of failure or security issues.

Cloud has also several features which give the opportunities to fill the gap between University and Industry Collaboration

a) On-demand resources
b) Connect from anywhere (broad network)
c) Multitenancy
d) Security
e) Sustainable
f) Automation
g) Easy to use

And many more. These features motivate for continuing involvement and development of UIC.

IV. ROLE OF CI/CD USING CLOUD COMPUTING IN UNIVERSITY-INDUSTRY COLLABORATION

University and industry collaboration is needed in the current state of Education 5.0. Collaboration means not just signing an MoU but it should be a Memorandum of Utilization of the strength of both entities and defeat their limitation of them to make better, future-ready, industry-ready, and society-ready outcomes. Cloud-based collaboration helps UIC to connect virtually with each other for the exchange of knowledge, research activity, student and faculty development, etc

Here we describe several features which we can achieve through Cloud-based Collaboration between University and Industry.

1) *Content Development and Data Sharing*: Cloud computing technology is used over the internet. It means we can access it from anywhere and anytime. Cloud-based collaboration allows universities to get support from the industry to develop the content of the course according to industry requirements. Data Sharing is one of the key features of the cloud which provide the feature of efficiency and security for storing, sharing, and evaluating data. It helps to Analyze and get insight into current and future trends
2) *Resource Pooling*: Technology is excessively changing day by day. To catch this change, universities and Industry also need to update their infrastructure and other resources continuously. Cloud has the features of resource pooling. It shares computing power, storage, and other software tools. Somehow more expensive software which is not able to be owned individually. It can be possible through Cloud. Through this approach, U&I both can monitor the uses of their resources, automated scale the resources for managing the workload, and reduce and optimize cost under pay as you go, the model
3) *Virtual Training and Development*: Cloud has changed the way of training and development. Now in place of onsite training cloud provides online/offsite training which saves cost and time and provides the features of flexibility. Demand Resource Availability, Elasticity, and Cloud Service Model help to provide instant access to resources, and a virtual lab for training and development. Virtual lab development also helps to avoid the issue of software licensing.
4) *Magnify Learning and Development Opportunities*: Cloud-based collaboration helps students to magnify the learning and development opportunities for solving real-time problems and real-time project development. It helps to enhance their practical Skills, and ability and improve critical thinking for problem-solving. Students can work on real-time problems and implement their skills for solving them. Industry can continue to help by guiding, evaluating, and monitoring their skills. Industry Involvement also helps in upskilling the students. It helps to fill the gap between university and industry regarding preparing and developing students for skilled industry ready.
5) *Knowledge Transfer*: Cloud provides virtual engagement between University and Industry. This helps to exchange knowledge, information, and technology between the university and industry. It can help to work on new research ideas or problems for better research funding, improves the practical Skill of Students, and improves the ability of teachers to adopt the new technology as per industry. Opinions and expectations are key to successful academia-industry partnerships in knowledge creation [16]. Employee exchange also accelerates the benefit of knowledge transfer. Transparent knowledge exchange fills the major gap between University and Industry.
6) *Accelerated Research and Innovation*: India is highly focused on research and innovation. University success is identified based on research activity, research grant funding, and publication. UIC on research helps to improve research activity for positive success. UIC helps for solving real-time problems and innovate new solutions.

Cloud provides a platform to come together with the university and industry to accelerate innovation, pooling resources, research projects, and technology and knowledge transfer for better R&D solutions. UIC also has opportunities to grant more research funds for R&D.

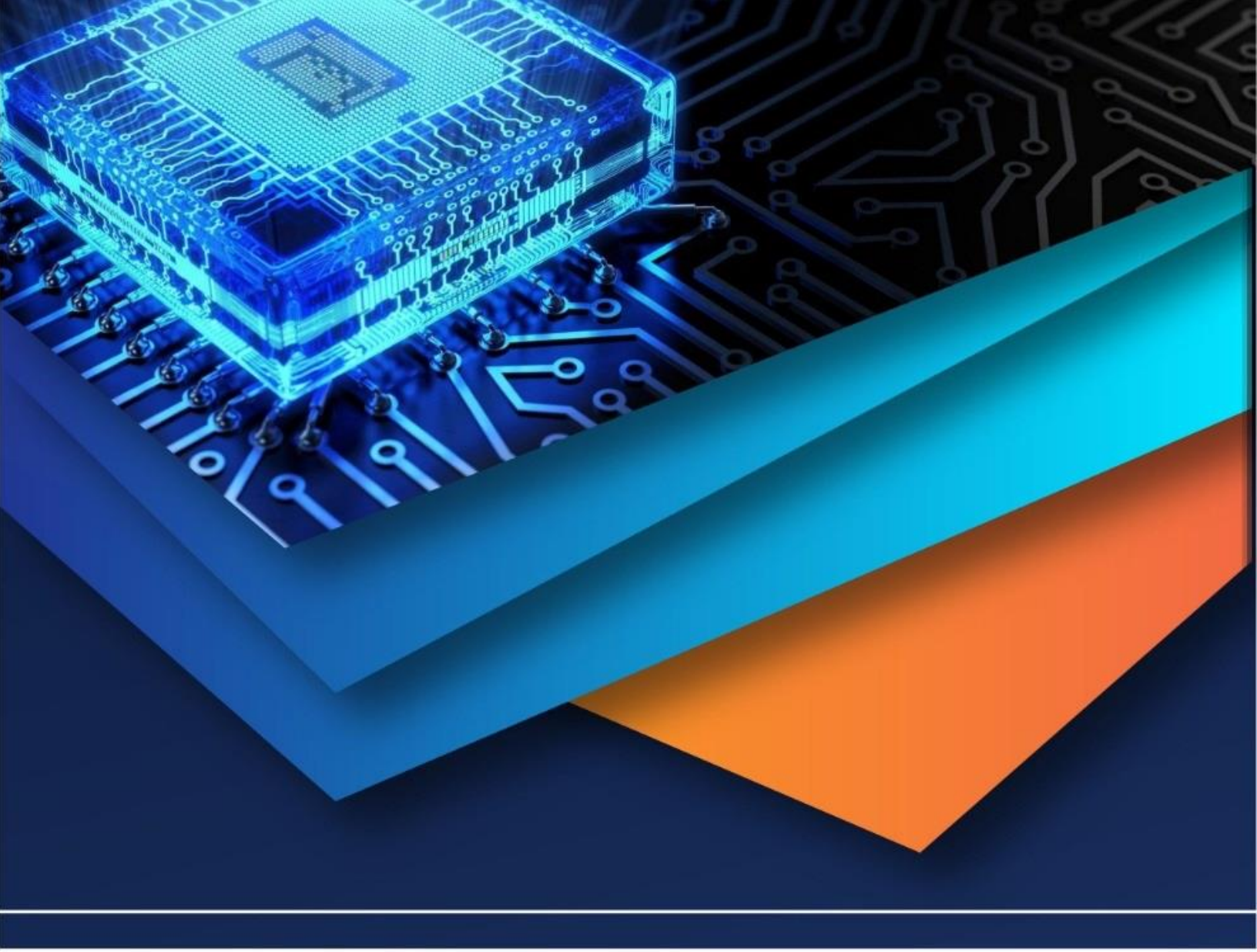
V. CONCLUSION

Cloud-based university and industry collaboration help to achieve the objective of Education 5.0 and Industry 5.0. Cloud has several features which help to this collaboration make more transparent, effective, accurate, and value driven for all the entities of it. Continued involvement of industry and university or academia helps to improve the quality of resources which helps students, faculty, and other parts of academia. UIC helps to focus on practical-oriented and outcome-based education to make skill base students for the developing nation of India. The collaboration also helps to do problem-driven research and innovation which helps both entities as well as society. The government also supports by providing a high level of research funding for that to them. In the future, we propose to develop CI/CD-based model using cloud computing for university and industry collaboration.

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