

# A Survey on Collaborative Learning Framework Using Cloud Computing

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## ABSTRACT

Cloud computing as a replacement paradigm has full-grown from a promising plan to as a minimum one of the fastest evaluation and improvement paradigm in schooling region. It's a hot evaluation area that applies altogether sectors anywhere we tend to want high overall performance and short get right of entry to resources and offerings. Cloud computing usability in training is wide-ranging, as recounted by several instructional establishments spherical the arena. Pc-supported cooperative getting to know (cscl) is concerned with however information and verbal exchange technology (ict) would probably facilitate getting to know in teams which might be co-located or allotted over a community of computer systems like net. Cscl supports powerful mastering via manner that of verbal exchange of principles and statistics amongst beginners, cooperative get entry to of important documents, and feedback from teachers and friends on mastering activities.

As the cloud technology rectangular degree steadily turning into standard and cooperative mastering is evolving, new guidelines for improvement of cooperative learning tools deployed on cloud square measure deliberate. Improvement of such learning gear needs access to giant expertise keep on inside the cloud. Making certain affordable get right of entry to such know-how is hindered by way of the high latencies of wide-location networks underlying the cloud infrastructures. To boost rookies' know-how via speedy information get right of entry to, important documents is replicated accordingly a bunch of rookies will access know-how from near places. Considering that a cloud placing could be very dynamic, useful resource handiness, community latency, and learner requests may modification. for the duration of this paper, we will be predisposed to gift the advantages of cooperative learning and specialize inside the significance of facts replication within the style of this sort of dynamic cloud-based totally machine that a cooperative gaining knowledge of portal uses. Survey is employed as a pursuit fashion to validate the planned answer. The outcomes display that the notion to boost teaching could be very supported with the aid of the specialists running within the exchange and world.

**Keywords:** Cloud computing, Cscl, Collaborative learning.

## I. INTRODUCTION

The idea of collaboration may be an elementary sort of act that fosters operating in little teams to attain some common goals. Cooperative learning may be a situation wherever 2 or a lot of individuals learn or conceive to learn one thing along. people engaged in cooperative learning exploit each other's resources and skills (asking

one another for data, evaluating one another's concepts, observation one another's work, etc.). notably, cooperative learning relies on the model that information will be created among a bunch wherever members actively move by sharing expertise In different words; learners have interaction in an exceedingly common task in cooperative learning wherever every individual depends on and is responsible to every different. Initially, cooperative learning and its social aspects couldn't attract the eye of technological support. However, Computer-Supported cooperative Learning (CSCL) may be a relatively new academic paradigm among cooperative learning that exploits technology in an exceedingly learning setting to support cluster interactions in an exceedingly cooperative learning context). CSCL strategies use technology to regulate and monitor interactions, to control tasks, rules, and roles, and to intervene the attainment of recent information. Recently, CSCL has become the quickest growing space of analysis within the field of computer-aided education. In general, it articulates 2 essential concepts: initial, the concept of learning in an exceedingly cluster as already mentioned. Secondly, it stresses the role of the pc as associate degree intervener within the whole method.

Thus, CSCL helps the people learn to collaborate and collaborate so as to be told. Moreover, experimental study reveals that network-based collaboration could offer opportunities for additional equality in cluster work than actual face-to-face cluster work. Info and Communication Technology (ICT) tools like sharing teaching and learning materials, victimization discussion forums, etc. will play a significant role within the learning method in wherever learners share their data and experiences through the forum; get fast access to the essential materials then on. With advancement of cloud systems, additional and additional internet primarily based applications area unit being developed victimization cloud technologies. These technologies provide ample calculate and storage resources for cloud-enabled applications. Additional specifically, cloud computing offers datacenter computing power and storage. Hence, cooperative and e-Learning frameworks area unit being developed in a very cloud primarily based system. Cloud-enabled cooperative learning framework can so have the advantage of resource snap offered by the cloud technology. National Institute of Standards and Technology (NIST) defines cloud computing "as a computing model that offers network access to a configurable resource pool, the access being location clear, convenient and on-demand". These resource pools encompass calculate cycles, storages, applications and services which may be utilized by the top user with a minimum maintenance and interaction with the cloud supplier. There are a unit primarily 3 models for services delivery in cloud computing: code as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). The proposes another model for service delivery in cloud computing called Learning as a Service (LaaS) that may well be thought-about for cloud primarily based cooperative and e-learning tools. In a very cloud-based cooperative learning state of affairs, cluster of learners and also the professional person are often settled in geographically distributed locations. Attributable to this distributed nature, learners' want of immediate access to resources is vital. To the current finish, this paper studies the practicability and pertinency of a cloud-based learning tool, identifies the key needs in respect of effective access to learning resources and proposes a development framework. consequently, we have a tendency to designed a cooperative learning platform epitome and that we devised associate economical replication technique for correct dissemination of learning resources among the learners and conducted simulation experiments so as to gauge the end-user expertise, utility and satisfaction.



Collaborative Learning in E-Learning has been projected and enforced to boost the idea of E-Learning Management System (ELMS). Therein, numerous service layers like interface Layer, Learning Services Layer and Infrastructure Layer kind the backbone of the system. The interface provides the Graphical interface (GUI) to access numerous options and services provided by the system. The training Services Layer deals with the business logic of these services provided. And also the Infrastructure Layer provides the design of the system. Web has been used because the means that to link and connect multiple teams unfolds across wide geographical boundaries. Each cluster has many agents together with student agent, teacher agent and pedagogue agent. The scholar agent assists the learner in accessing the resources accessible. The teacher agent assists the teacher in providing a large type of resources. The trainer agent acts as a intercessor between the learners and also the academics facilitating the resources and services provided by the academics to the learners. Tho' this forms an efficient system, however this doesn't address the dynamics of the ways that within which a student will optimize his/her learning.

There is a considerable quantity of analysis on the Cloud field for college students and also the investigator expressed that cloud computing based mostly answer for building a virtual and private learning setting which mixes a large vary of technology, Associate in Nursing tools to make an interactive tool for science education. The planned setting is meant for planning and observance of instructional content in addition as making a platform for exploring ideas. The system permits exchange of instructional content and integrates totally different education approaches to learning and teaching underneath identical setting. Some author say on the point of offer cloud storage to store and transfer the info for the lecturers as study material, Assignments and different stuff. These drives additionally permit to the principal and Examination cell authorities to transfer this notices for student. The designed cloud storage (Drive) is employed at intervals computer network by exploitation local area network affiliation and additionally by exploitation Wi-Fi. The Drive facilitates employees with a separate and restricted area to store and transfer U-Learning exploitation Cloud Technologies knowledge with its own access privileges.

## II. RELATED WORK

Many research methodologies were proposed in literature. However, choosing the most suitable methodology in accordance with study context and objectives is a crucial step to succeed in research. Towards this end, socio-cognitive engineering methodology was chosen for several reasons. The framework was built on the same base of user-centered design. This means that the interaction of users should be considered. A significant benefit of this notion is that their social interactions, styles, working strategies, language, and communication patterns should be involved in the design process. Another reason is that this framework was successfully tested and evaluated in learning systems. The main concept of cognitive engineering underlies the improvement of interaction quality between individuals and technologies. Socio-cognitive engineering methodology was defined as “a framework for the systematic design of socio-technical systems (people and their interaction with technology) based on study and analysis of how people think, learn, perceive, work and interact”. The framework consists of two phases: activity analysis and systems design. Figure 1 depicts the main stages in this



framework. A. General Requirement The scope of the research and users who will benefit from and apply the system should be identified at this stage. In this study, the general requirement is developing a Universal Design for Learning-Based Teaching Collaborative System. This system will help instructors from different disciplines implementing accessible learning to serve learners with and without disabilities. However, considering that teachers are learners as well, the system will be designed according to UDL principles in order to serve their individual abilities and preferences.

1) Field Study In order to design a system, the required data should firstly be collected. A mixed method (qualitative and quantitative) will be used for an in-depth understanding of the requirements of users and evaluate the system. The collection data will include: x Surveys: pre and post-surveys will be distributed. The former is to collect initial data that identify the actual need for the system from users' perspective and the main requirements, whereas the latter will be used in order to evaluate the system. X Interviews: it is very important to understand in depth the main requirements of educational institutions in order to apply the system. Furthermore, stakeholders and decision makers will be interviewed in the early stages of the system's cycle life in order to avoid any failing in the design process. Structured and semi structured interviews can assist evaluating actual user needs and understanding their perspectives after implementing the system.

2) Theory of use in the first stage of this research, we reviewed the literature that fostered UDL principles. Several databases, search engines, and journals were searched to retrieve the relevant studies. The gap in current research is that empirical experiments were conducted or controlled by researchers from educational background. This is due to the lack of inclusive design knowledge of teachers from other disciplines. The reviewed studies emphasized the effectiveness of conducting UDL training programs for universities' instructors to develop lesson plan, teaching delivery, and the positive implications of such programs on learner experience.

3) Task model This stage includes identifying the activities that users may perform to achieve their aims, how they can efficiently interact with each other and technologies, the technology that they mostly use to connect to the internet (desktop, laptop, mobile, and iPad), and the technology that they are using for educational purposes.

### **Design Concept**

1) Design Space the system's interfaces will be designed in accordance with UDL principles and usability concepts to ensure providing user-friendly interfaces. Furthermore, users will be able to customize the interfaces according to their preferences.

2) System specification all functional and non-functional requirements of the system will be provided. This may include: x Functional requirement: log in, discussion, collaboration, and uploading learning materials (i.e. links, files). x Non-functional requirement: reliability, security, and usability. X User-requirement: accessibility, adaptability, hardware, software, and communication. X System requirement: connectivity, web-based application, and asynchronous connection.

3) Implementation the UDL-based teaching-collaborative network will be developed using a dynamic programming language to enable users browsing the system whether by a computer or smart device such as mobile or iPad. ASP.Net, HTML5, CCS3, and SQL Server database will be used to develop the system.

4) Testing Perspectives of end-users and experts will be taken into account in this phase. The Technology Acceptance Model (TAM) will be adopted to test behavioral intention of end users to accept this innovation. Although many models were proposed to examine a technology adoption, TAM has occupied a considerable significance. Additionally, a standard questionnaire will be developed to investigate learner satisfaction. In order to evaluate usability of the system, the heuristic approach will be used. According to Ardito et al., this method has successfully been applied to evaluate elearning systems.

5) Deployment This stage represents the real life of the system. After implementing and developing the proposed prototype, it will be deployed on the university server to be used by users.

### III. COLLABORATIVE LEARNING

In collaborative learning, shared learning experiences allow learners to engage in discussion, converse with other learners, and present or defend ideas, which enhances not only interaction among learners, but also critical thinking and problem-solving skills (Armstrong & Hyslop-Margison, 2010; Kuo & Belland, 2016; Kuo, Walker, Belland & Schroder, 2013; Gokhale, 2013; Smith & MacGregor, 2014). At its core, collaborative learning is learner-centered. But it additionally involves multiple students working together to accomplish common goals. Collaboration can be facilitated with various forms of communication in face-to-face or computer-supported settings (Laal & Laal, 2012). Blogs support collaborative learning by enhancing knowledge acquisition, knowledge sharing, and reflective processes (Wang, 2010; Yang & Chang, 2012). For example, Wang (2010) investigated students' perceptions of utilizing blogs as a platform for content review, data collection, and idea sharing in collaborative groups. Students perceived that blogs (a) are a useful tool to reflect and interact with classmates, and (b) enlarged the resources of learning support. Yang and Chang (2012) examined the influence of integrating blogs as supplementary tools on student learning in a traditional instructor-led class. Blogging was found to be a medium that enhances asynchronous peer interaction, reflection, and positive attitudes toward academic achievement in collaborative activities.

**Sense of community** Sense of community refers to "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (McMillan & Chavis, 1986, p. 9). Sense of community can be determined through shared goals and responsibility, student-instructor interaction, learner-learner interaction, value and interest, peer respect, and emotional connection (Cho, Bang, Mathew, Bridges, & Watson, 2010; McMillan & Chavis, 1986). Students' sense of community is positively related to learning outcomes, including learning experiences, achievement, and student effort (Sadera, Robertson, Song, & Midon, 2015; Sánchez, Colón & Esparza, 2015). Furthermore, from a self-determination theory perspective, sense of community is similar to the concept of belongingness, which is one of the three motivational needs (i.e., competence, relatedness, and



autonomy; Ryan & Deci, 2000). Blogs can enhance sense of community by increasing participation, engagement, and interaction in classroom or online learning (Cuhadar & Kuzu, 2010; Yang, 2009). Learners are more engaged when in blog-enhanced settings than when in other web-based environments (Yang, 2009). Appropriate use of blogs with instructional strategies that align with course content contributes to feelings of a learning community. Through peer dialogue, learners develop reflective thinking and self-examination skills that result in personal growth and knowledge acquisition (Cuhadar & Kuzu, 2010; Xie, Ke, & Sharma, 2010).

**Blogging self-efficacy** Blogging self-efficacy refers to confidence in performing multimedia tasks in blogging, including capturing multimedia, multimedia processing, and content transfer to a blog. Research has shown that blogs can be a useful tool for formal and informal learning in various disciplines (Park, Heo, & Lee, 2011). Students' confidence in using blogs may influence their learning experience in a learning environment where blogs are required (Top, 2012). Blogging self-efficacy is associated with one's self-efficacy in using information and communication technologies (Papastergiou, Gerodimos, & Antoniou, 2011). Research on the impact of blogging self-efficacy on perceived learning is scarce. Hence, we assumed that blogging self-efficacy may influence perceived learning in this study.

**Asynchronous E- Learning (AE):** For naive learner i.e. with no previous knowledge about the task, asynchronous mode of E-Learning is suggested by the Cognitive Agent. The agent interacts with the Tutoring database to guide the tutoring path to provide the basic introductory knowledge about the task to the learner. The core module of any expert system is its Knowledge Base (KB). It is the warehouse of domain specific knowledge captured from the human experts via Knowledge Acquisition Module. After some time, the Cognitive Agent evaluates the learner on the basis of knowledge acquired about the task and assigns a level to the learner. The assigned level is matched with the previous level in the learner database. If the new assigned level is higher in priority than the previously allotted level, then the learner is informed about the success in gaining knowledge and is allowed the access to Synchronous E-Learning and social interaction (Collaborative learning). The Cognitive Agent also tracks and compares the learning path followed by learner. If the new level is higher and the path followed by the learner is new, then it is added in the Tutorial Database, than the Otherwise, the learner is again given with the information of similar level about the topic. The learner database LD can be retrieved to discuss the success of the learner in gaining knowledge about the task T. As the learner is evaluated on the basis of thought, learning and perception, thus this is referred as Cognitive Evaluation.

**Synchronous E- Learning (SE):** For adapted learner, learned learner and researcher, synchronous mode of ELearning and social interaction is suggested by the Cognitive Agent. It provides more detailed and complex knowledge about the task T from the other part of the Knowledge Base (KB).

**Knowledge Generation (KG):** The Cognitive Agent also tracks new knowledge generated by the learner during learning process. The knowledge generated may be content related to the task or learner's cognitive process during learning which can be later used to guide the cognitive agent for tutoring the learner. It then checks the novelty of the generated knowledge. If the uniqueness of the new generated knowledge is verified,

then it is written in the Knowledge Base (KB). This learning process is continuous till the learner attains the desired knowledge about the task T.

The Cognitive Agent performs the following tasks: User interaction, Content Presenter, Assigning and updating learner's level, Knowledge Generator: Content and Tutoring path, Identifying and comparing different tutoring paths.

Label 3: Knowledge Base The generated knowledge is stored in the Knowledge Base KB. The Knowledge Base is divided in to three parts depending upon the type of knowledge stored in it:

- Introductory: Definitions, History, and Evolution.
- Examples, Structure, Diagrams, Working.
- Advanced: Theoretical Concepts and Models.
- Research Oriented: Relation with other fields in present scenario

Label 4: Dissemination of learning results an important goal of research is to transfer the research results to the industrial applications and adoption of these results by the industrial applications. The Learner Database (level of learner before and after E-Learning) and Tutor Database (tutoring path followed by the learner) can be used by the Domain Expert to determine the impact of asynchronous and synchronous modes of E-learning and the impact of social interaction on the learning ability. It can be used to study which mode of learning is beneficial for a particular type of learner. This helps in self learning through self evaluation. It guides the Domain Expert to generate domain content and tutor path for efficient learning. Personnel involved in Expert System

**Development:** Learner: Checks the efficacy of the system. Domain Expert: Collects and represents the domain specific knowledge in the Knowledge Base and tutor path in the Tutor **Database**. Knowledge Engineer: Development of Learner-Interface, Cognitive Agent and structure of Knowledge Base, Tutor Database. System Maintenance Personnel: Hardware and software maintenance of the system.

#### IV. CONCLUSION

In this survey paper we introduced a computer supported collaborative learning framework based on multi-tier hierarchical cloud structures. Our framework uses popularity based distributed replication technique for efficient access of learning resources. The replication technique uses the data access histories for popular files to compute optimal replication locations designed to improve the overall data access performance by minimizing replication costs (for both accesses and updates) assuming a given data access pattern from the learners. Our results suggest that our replication-centric collaborative learning framework is successful in deciding which data files should be replicated and where the replicas should be placed. The available storage capacities of the data centers naturally have a major impact on the performance of replication technique. Increasing the data centers' storage capacity leads to performance improvement in terms of data access time.

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