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Computer Supported Collaborative Learning: An Introduction

Pallavi Pandey[1] and Rages John[2*]

[1]Department of Education, University of Lucknow, UP. India
[2]Govt. Brennen College of Teacher Education, Thalassery, Kerela, India

*Corresponding author: ragesjohn@gmail.com

ABSTRACT

Collaboration has always been the basic nature as well as requirement to survive on this earth. In the present scenario collaborative learning has changed its settings due to the presence of technology like computers, mobile devices online systems etc. computer supported collaborative learning is the use of computer device as a medium to establish collaboration as the central strategy in teaching-learning process. It is a great initiative to provide a rich experience in collaborative settings to enhance the learning process. To inculcate computer supported collaborative learning in our regular teaching learning practice it is necessary to modify the traditional setup and to train teachers to adopt such changes. This paper explores the theoretical concepts, basic collaborative techniques in computer supported collaborative learning environment and challenges in implementation of CSCL in teaching learning process.

Keywords: Collaborative learning, computer supported collaborative learning, peer review, Jigsaw

Since, the very beginning of human society, collaboration has always been the basic nature as well as requirement to survive on this earth. This society itself is the result of the process of collaboration. Education has always played the crucial role in the development of any society; it also involves the process of collaboration. So, one can say that collaboration is a crucial factor to attain the very objective of education system and that is to generate new knowledge, explore the existing body of knowledge and simultaneously provide a rich learning experience to the students. But in the present scenario collaborative learning has changed its settings due to the presence of technology like computers, mobile devices online systems etc. Various efforts have been made to integrate technology in learning conditions like Computer Mediated Instructions, Computer Assisted Instructions etc. As the result of these

consequences Computer Supported Collaborative Learning was a great initiative to provide a rich experience in collaborative settings to enhance the learning process.

MEANING AND DEFINITIONS

In the simplest words computer supported collaborative learning is the use of computer device as a medium to establish collaboration as the central strategy in teaching-learning process. The computer device (with internet/ without internet) here works only as a medium to establish collaboration among students with the intention to provide a platform that can promote the sharing of ideas, views and their own understanding of the learned content with other peers in order to easily gain the targeted learning objectives.

According to Ward and Tiessen (1997) CSCL is an instructional approach that attempts to engage students in the intentional pursuit of their own learning goals and in social interactions aimed towards the development of understanding.

CSCL is focused on how collaborative learning supported by technology can enhance peer interaction and work in groups, and how collaboration and technology facilitate sharing and distributing of knowledge and expertise among community members." (Lipponen, 2002)

Computer Supported Collaborative Learning is the scaffolding of collaborative and distance learning through the mediation of a computer system, usually via the internet, through appropriate computer software or e-learning platforms. (Voulgari and Komis, 2011)

As per the above definitions CSCL is relatively a new paradigm in educational system which make the use of technology especially a computer device with or without an internet connection, to control and monitor interactions, to regulate tasks, rules, and roles, and to mediate in order to make the task of learning easy and interesting.

EMERGENCE

One can find many instances of use of computers in education from past several decades. Credit for the first effort of using machines in teaching- learning process goes to Sidney L. Pressy. Before 1970s, many contemporary researchers got influenced by the behaviourist learning theories and developed various programmes based on drill and practice method. In the 1970s, with the emergence of cognitive learning theories, the program designers began to envision learning technology that employed artificial intelligence models that could adapt to individual learners. But computers in classrooms faced immense criticism of creating isolation during the learning activities. Most of the critics consider them boring, anti-social and inhumane form of training. Opposite to this criticism, Computer-supported collaborative learning emerged as a strategy rich with research implications for the growing philosophies of constructivism and social cognitivism. It proposes to development of new applications and software that bring the learners together and can offer creative activities of intellectual

exploration and social interactions. Also the existing potential of internet to connect people in innovative ways on various platforms has proved a stimulus for CSCL research.

As computer supported collaborative learning is now an innovative work in the field of education but it is quite tough to state whether it had emerged as a separate area or as an emerging paradigm of educational technology. As per the records the very first workshop on computer supported collaborative learning was held in the year of 1983 entitled "Joint Problem Solving and Microcomputers" in San Diego. With a gap of six years in 1989, the term "Computer supported collaborative learning" was formally introduced in a NATO-sponsored workshop in Maratea, Italy. In 1995, a biannual CSCL conference series started and its first international conference was held in Bloomington (Indiana). In 2006, the international journal of computer supported collaborative learning (ijCSCL) was started by the research community under the publication of springer.

THEORETICAL PERSPECTIVE OR ASSOCIATED THEORIES

As a result of origin, the field of computer supported collaborative learning is multidisciplinary in nature. Observing the name itself suggests that it is a combination of the works in the field of computer technology, collaboration and learning or education, different type of scientific domains themselves and contains several theories individually. CSCL has emerged out of work in fields like informatics and artificial intelligence, cognitive science and social psychology, the learning sciences and organizational management—domains that are themselves each fundamentally multidisciplinary.

Collaboration Theory: collaboration is the central strategy of computer supported collaborative learning that is intended to provide by technical interference. Gerry Stahl in 2004 suggested the collaboration theory as a system of analysis for CSCL which postulates that the construction of knowledge is the result of social interactions. In the collaborative settings the task of learning is considered as a dynamic process with in the gathering of people instead of acceptance of the prior established facts, rules and ideas. On-going and evolving result of complex interactions taking place within communities of people generates the knowledge in a collaborative setting. According to Michale Bruckner there are four crucial themes in collaboration theory:

- Collaborative knowledge building
- Group and personal perspectives intertwining to create group understanding;
- Mediation by artefacts (or the use of resources which learners can share or imprint meaning on); and
- Interaction analysis using captured examples that can be analyzed as proof that the knowledge building occurred.

The term Collaborative knowledge building is considered as a more concrete than learning, here, is the main task of the group members. In this process of collaborative knowledge building the group and personal perspectives intervene to create a group understanding mediation by the artefacts or resources which learner share. To confirm the output of the collaborative activity the interaction analysis is considered an important practice after the collaborative task.

In CSCL the more the technical support will be advanced and convenient the more positive outcomes we can achieve in the form of new knowledge or understanding. So the theory of collaboration demands here that the technical support to provide the latest and easily accessible media that foster the building of collaborative knowing; facilitate the comparison of knowledge built by different types and sizes of groups; and help collaborative groups with the act of negotiating the knowledge they are building.

Vygotsky's Social Learning Theory: First theory we come across when explaining CSCL. In this text we are going to highlight those key elements of social learning theory of vygotsky that are directly related to the very notion of computer supported collaborative learning. Having influenced by Hegal and Marx, he rethought the nature of human psychological capabilities and proposed a dynamic explanation of the human mind in society.

First concept needs to be focused here is the Hegelian term "mediation" central for vygotsky. Mediation is about how one stimulus could mediate or connect the memory of or attention toward another stimulus. In Hegelian terms, this is a matter of mediating (with the first stimulus) the relation (memory, attention, retrieval) of a subject to an object (the second stimulus). This concept is central to CSCL as here the mediation is provided by technological networking and learning occurs through interactions among members of a group by sharing ideas, thoughts, and views etc which works here as a stimulator causing the other stimulus to generate thus collaboratively produce new understanding.

The second most important concept defined by vygotsky is the *zone of proximal development.* According to vygotsky " what we call a Zone of proximal development ....is a distance between the actual development level determined by individual problem solving and level of development as determined through problem solving under guidance or in collaboration with more capable peers". This can be explained as the learning distinction and developmental gap between what individuals can do by themselves and what they can do in collaboration. It will take more time to learn a difficult concept individually in comparison to learn it collaboratively with a group of people. This is also consistent with Vygotsky's principle that people develop cognitive abilities first in a social context—supported or mediated by peers, mentors or cognitive aids like representational artefacts—and only later are able to exercise these cognitive abilities as individuals.

Another theory closely related to CSCL is of cooperative work as some researchers found that the inspiration for CSCL arose from the research on Computer-Supported Cooperative Work (CSCW) according to Hoare. The area of Computer supported collaborative learning is younger to computer supported cooperative work. Sometimes both the terms, collaboration and cooperation used interchangeably but instead of having some similarities there are some key aspect of differences in both the terms. According to Oxford (1997), collaboration is distinguished from cooperation in that cooperative learning is considered more structured in its form, more prescriptive to teachers about the teaching technique, more directives to students concerning how to work together in groups, and more targeted. Collaborative learning, in contrast, is related to social constructivist epistemology, with the goal of acculturating students into the immediate community of learning and the wider world of the target language and culture.

Roschelle and Teasley (1995, p. 70) give a more detailed explanation, suggesting that cooperative work is "accomplished by the division of labor among participants, as an activity where each person is responsible for a portion of the problem-solving," whereas CL involves the "mutual engagement of participants in a coordinated effort to solve the problem together."

Principles of Cooperative Learning: Cooperative learning and collaborative learning do not differ in terms of whether or not the task is distributed. Some aspects of cooperative learning positively contribute to the success of computer supported collaborative learning environment. Such elements as described by Johnson and Johnson are positive interdependence, individual accountability, promotive interaction, social skills, and group processing. All these elements are common to both CSCL and CSCW. So for the better understanding of CSCL it becomes quite important to make a deep understanding of all the similar concepts within.

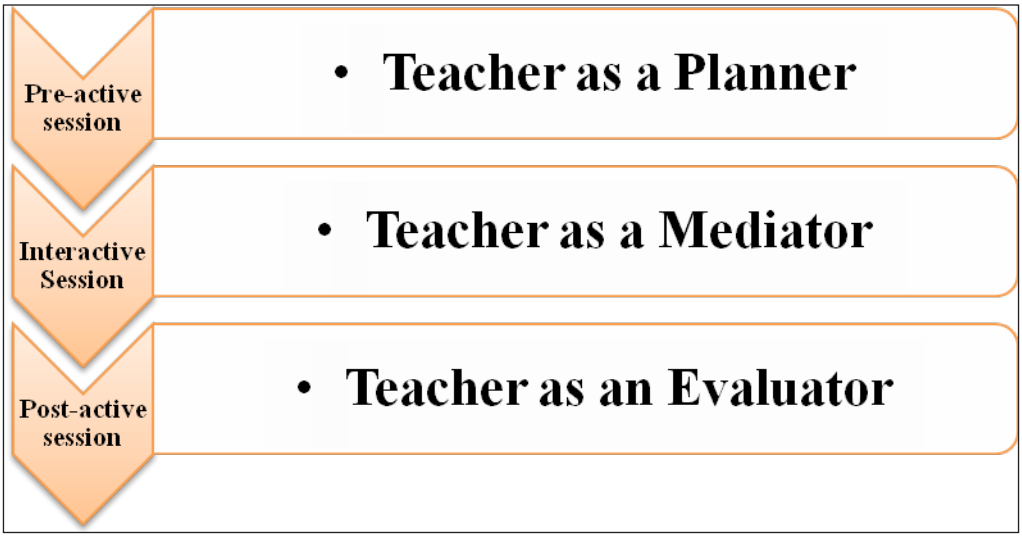
After a review of all these learning theories it is common that each of these focus on the social aspect of knowledge building and recognizes that learning and knowledge building involve interpersonal activities including conversation, argument, and negotiation. It is the central task in CSCL to provide a collaborative environment with the assistance of technology that can make the process of interacting and sharing the opinions easy, convenient and more interesting.

TEACHER AS A PLANNER AND FACILITATOR

Teacher is a very important part of any type of teaching –learning process. In a collaborative setting the students are the central focus. Instead the focus on the students, teacher's role is also very crucial in formal settings of learning. As in traditional learning settings, the role of a teacher in computer supported collaborative learning also can be understood in three parts as:

1. **Pre active session (Planner)**
   - ❖ Selection of the topic to be discussed.

- ❖ Deciding the objectives of the session.
- ❖ Collection and arrangement of the resources related to the content to be provided to the students.
- ❖ Introducing the activity to the participants.
- ❖ To make students aware of what their goals are, how they should be interacting, potential technological concerns, and the time-frame for the exercise.



2. **Interactive session (Mediator)**
   - ❖ Kick-starting the discussion among the participants.
   - ❖ Proper administration of resources when needed during discussion.
   - ❖ Monitoring discussion to facilitate learning in between.
   - ❖ Capable to mitigate technical issues for the class.
3. **Post active session (Evaluator)**
   - ❖ Assessment of the whole activity in order to ensure the achievement of the objectives targeted.
   - ❖ Analysis of the performance or the contribution of each student in the session.
   - ❖ Analysing the percentage of success of the session. Is there any need for the next round or the present session remain successful in achieving the targeted objectives.
   - ❖ Point out those areas during organizing the whole session where improvement is needed before planning the next session.

It is quite clear by the above text that the teacher is not a visible member during the whole CSCL environment but a very crucial part of the session in the form of a facilitator and mediator. This means facilitating collaboration between students, encouraging them to monitor their understanding (without directly giving them information), communicating with them and carefully examining knowledge produced by the students, all are the obligations expected by the teacher.

BASIC COLLABORATIVE TECHNIQUES IN CSCL ENVIRONMENT

Computer supported collaborative learning focus on debate based learning and peer negotiation as grounded in social, cooperative, collaborative and constructive learning theories. The scope of CSCL is in all types of learning environment either face to face, remotely or a blend of both in traditional or online learning setup form primary to higher education level. Due to the widespread scope, the techniques, strategies and practices to be applied here depends on the set up, the level and most specifically on the topic concerned. Some common and the most popular techniques we shall discuss in the text here.

Since the theories which form the base of CSCL, considers interactions as a stimulus for the learning to occur, the designer has to structure the community into learning groups, and to choose the most appropriate technique to foster interaction and collaboration among peers. Role play, brainstorming, Jigsaw, numbered head together, case study, debate etc are such type of collaborative techniques requires in CSCL environments. Such techniques have their origin in face to face learning environments and are not strictly native to the e-learning sector. In fact these are borrowed from face to face learning and successfully applied to CSCL.

- **Peer review:** Peer review is another very common practice in a collaborative knowledge creating task. It contains three phases as follows; 1) Producing the artefact in the form of text, picture, chart or map etc; 2) providing feedback regarding the product by co-learners and 3) revising the product as pre the feedback received. Here the group members either may work in community form or the form of sub divisions of group. Peer review technique is being practiced in CSCL in the form of Collaborative writing popularly these days, specially using wikispaces. One of the most critical aspects connected with this technique is related to the presence and quality of feedback.
- **Jigsaw:** Jigsaw technique of collaborative learning is one of the most popular among CSCL techniques as it provides ample scope of interaction among the group members. This technique is used by dividing the activity in two phases. First one includes dividing the content to be work upon into small sections (generally 4-5) keeping in mind the focus points to be elaborated separately. Next move in the same phase is to make groups of the members (symbolized as the expert groups) according to the content subparts. In this phase each group works intensely upon the sub section allotted to them and investigates

the section completely or it can be said that each member of a group gains expertise of the content allotted. Only within group discussion occurs here not between groups discussion is required. After completion of the first phase the expert groups dissolve and the learners are aggregated into *jigsaw groups*, each composed of one representative from each of the expert groups. The task here for experts is to disseminate the understanding of their investigated content within the jigsaw group so that at the end all the groups gain a complete overview of the content. This jigsaw technique is very well practiced in the CSCL environment using the computers and internet as a platform to connect participant in virtual world.

- **Case study:** Case studies, if done in a collaborative environment may help in understanding the depth of a case or analysing its roots in multiple perspectives. A case study technique provides the opportunity to the learners to analyse the strong as well as weak aspects of a particular case and reflecting upon the possible solutions if required. In a CSCL environment the virtual cases may be provided to the groups to be investigated and the solutions can be applied for the real world problems having similar characteristics.
- **Role playing:** The latest use of Role playing technique in CSCL is in the form of virtual games. Learning through gaming is another new innovation in education field. It can also be performed collaboratively in an online or networked environment assuming the participants of the real world as the characters in the game in virtual world. These characters are generally called "Avatars" in the virtual world. During a role play, participants are asked to play a particular role (assigned by the teacher or choosen by the learners) so as to assume a particular point of view during a discussion with peers.

All these above discussed collaborative techniques can be used alone or in a combination of 2 or more techniques as per the demand of the situation. These techniques are very basic practices in a computer supported collaborative environment continuously being used from the very beginning of CSCL in collaboration with latest technological trends.

Free Online Collaboration Tools for Students and Teachers

Sl. No.	Collaboration tools	Purpose
1	Nicenet	Document sharing, communication, link sharing, and scheduling specially for education.
2	Collanos	Especially for Projects that require lots of communication, notes, and discussions to be held and kept in one place.
3	EtherPad	Web-based word processor allows multiple users to work simultaneously on a document.
4	Writeboard	Free web-based tool for groups to write, collaborate, share their individual work, and more.

5	Zoho Show	To create online presentations collaboratively with this powerful free tool.
6	Google Docs	Students can work on documents, spreadsheets, and presentations individually and collaboratively with this dynamic tool.
7	MemberHub	Up to 30 members can communicate in one place for free with this tool.
8	99 Chats	Personal chat room creation is possible with this tool.
9	Skype	For people at distance to make video and voice calls and even share files.
10	CiteUlike	To share scholarly articles collected from internet, organize and store them with this tool.
11	Notemash	Specially for college students, to allow share notes with others in a class.
12	Springnote	Can be used as a group notebook to keep notes for classes, projects, or other tasks.
13	Wridea	A great way to keep brainstorming sessions documented and organized.
14	Drop.io.	Students can share images, documents, audio and video files, and more with this tool.
15	ePals	Students can connect with other classrooms around the world with this tool that has a strict education-only focus.
16	Lomagoo	Students can share notes and study guides and even buy and sell text books on this site.
17	Student.com	High school and college students can find help with school work, prepare for college admission, and socialize with other students.
18	LearnHub	LearnHub is all about education sharing and allows students to share their knowledge, find what they need to know, and even study for major standardized exams.
19	CampusBug	To find resources for homework and projects as well as connections with other students.
20	Class Blogmeister	Teachers can use this free service to create a class blog and locate other class blogs to share learning across classrooms.
21.	Blogger	Free and easy-to-use blog.
22	Twitter	Micro blogging tool for connecting with people around the world and creating dynamic learning experiences.
23	Google Calendar	Google Calendar is a great sharable calendar that a whole class can use to stay on task with assignments, tests, and more.

CHALLENGES

The concept of CSCL is comparatively new in the field of education. Various challenges come across in implementing it in regular teaching learning practices. Challenges related to collaboration as well as with technology come across the way in CSCL environment. Challenges in CSCL can be divided into three parts: technical, organizational and pedagogical. Technical challenges refers to the hurdles come across teachers and students as per their expertise in

Information and communication technologies. "Organizational challenges" refers to the issue of how to obtain whole-school organization support for educational change with CSCL. The pedagogical challenges are being discussed in the text below.

As a teacher: As a teacher the responsibility is not less in CSCL environment as comparing with traditional setup. Here a teacher is a facilitator and a co-learner as well. To facilitate collaboration among the participants requires a lot of expertise as you have to escape the process becoming monotonous, keep every student engage in the learning process, monitor their understanding, and carefully examining knowledge produced by the students. Sometimes it has been noticed that the teachers don't take interest in CSCL either due to other obligations of the institutions or coz of their less expertise. In that case, without actively participating in students' collaborative learning, the teacher can neither help the students to advance their learning process, nor recognize significant contributions, nor generalize emerging progressive practices of collaborative learning. So in order to achieve the positive learning outcome the teachers need practical knowledge with good approach.

As a student: During teaching-learning, it is of immense importance to consider the individual differences among students. The aim of CSCL is to provide a common and mostly optimal experience for all the students. It has been noticed that some students feel uneasy in such collaborative environments either because of their limited technical competencies or different learning styles or may be due to introvert behaviour patterns. Here it becomes quite challengeable to overcome their barricading and equally and actively participate with others.

Another important issue related to the medium of communication in CSCL environments. Mostly in CSCL practices, the participants use written medium to express their ideas to others. But it will be unfair to expect from young children making their ideas visible to others in written form. This medium can be proved useful for adult participants to some extent. So a detailed exploration concerning the characteristics of an individual student's ways to cope and perform in new learning environments is needed to explain and understand the cognitive advantages and challenges of computer-supported collaborative learning.

Apart from the challenges for teachers and students other technical and managerial problems are also the matter of concern. For successful implementation of CSCL one needs to focus on several aspects simultaneously as organizing a session of CSCL also need collaborative efforts from the teachers, students, technicians and administrative support also. Though the access to technology has improved since last 10 years, teacher's attitude and poor internet connections continue to be the barriers to more widespread usage of CSCL pedagogy.

CONCLUSION

To inculcate computer supported collaborative learning in our regular teaching learning practice it is necessary to modify the traditional setup and also to train teachers to adopt such

changes. The advantages of traditional setup of lectures, classrooms can't be totally denied but it is evident from the researches that practicing computer supported collaboration in an integrated form with the traditional setup surely helps to provide a rich learning experience. So it should be an integrated part of the whole learning environment. To facilitate CSCL in education, a substantial change in pedagogical practices and in the wider culture of schooling is needed.

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