COLLABORATIVE LEARNING USED IN TEACHING THE INFORMATION TECHNOLOGIES CONCEPTS

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Abstract: The article briefly presents a review about the Computer-Supported Collaborative Learning. Will be introduced different elements for CL, a few principles of using CL and what is a Collaborative Virtual Environment (CVE). In the second part will be discussed about how to use the CL to teach fundamental concepts from IT. The study case presented uses CL concepts to teach the Merge Sort algorithm.

Keywords: E/Learning, Computer-supported collaborative learning: CSCL, Collaborative Virtual Environment: CVE

1. INTRODUCTION

The Romanian educational context has changed under the influence of socio-political factors and the progress of Information Technologies. The education pattern has changed the paradigm of learning based on progressive retention of information (ancient type) to the modern learning paradigm based on experiential learning (skills acquisition) and social interaction.

This article concerns the concept of collaborative learning (CL), where the full term is Computer-Supported Collaborative Learning (CSCL).

CSCL is a sub-branch of science education that is concerned with studying how people can learn together through mediated systems.

Panitz thought to a similar definition and added only that the teacher must control documents after the educational planners with very clear objectives. Kagan has developed learning activity subject adding a targeting component of social interaction. Johnson, Johnson and Holubec (1993) say that collaborative learning leads to maximize learning for all educational actors. Slavin (1996) stresses the element of collaboration: teamwork and common goals of the team. ipei. By G. Stahl [et. the] quoted by Traian Rebedea – in "Collaborative learning", "it is important to view CSCL as a vision of possibilities that computers hide and a bundle of research directions that should be followed, rather than an established lab practice and teaching widely accepted ".

2. CSCL EVOLUTION

More avant-garde projects such as: project ENFI - Gallaudet University, the project CSILE - University of Toronto and the "5th Dimension" - University of California - have led to the concept of CSCL. All three projects have included and tested new ways to develop reading and writing through technology. The ENFI project led to one of the first

software to communicate through text (now chatting) "CSCWriting" (Gruber, Peyton & Bruce, 1995).

The CSILE project (Computer Supported Intentional Learning Environment - Learning Environment mediated by computers) later known as the Knowledge Forum fashioned a new pedagogy for perceiving classrooms as small communities that develops knowledge.

The "5thD" was developed with the idea of developing reading and writing skills.

All these projects have used computer systems and information technology in the interest of education and for developing new activities introduced in the training of social organization. Thus were laid the foundations of CSCL. A seminar in 1989 Maratea, Italy is considered the start of the CSCL because it was the first international public meeting that sugested the term "computer supported collaborative learning". CSCL first conference was held in US in 1995 marking a suite of many other annual conferences that followed and which developed this research field. Among the most popular papers we can notice: Bruffee - Collaborative Learning (1993), Crook - Computers and the Collaborative Experience of Learning (1994), Dillenbourg - Collaborative Learning: Cognitive and Computational Approaches (1999), Bereiter - Education and Mind in the Age knowledge (2002).   Since 1996 the area was regularly enriched with various articles published by the International Journal of Computer Supported Collaborative Learning. In 2015 was published an anniversary article : "A decade of CSCL" by Gerry Stahl -known author.

Collaboration vs. Cooperation CL

Cooperation (cooperation or joint work) is achieved through collaboration ("action of work and its outcome. In collaboration (with ...) = participating actively through an effective contribution to a work jointly and together (with ...) "); by Oxford dictionary definition of cooperation is "the action or process of working together to the same end" with the origin late middle English: from Latin cooperatio(n-), from the verb cooperari (see cooperate); later reinforced by French coopération.

Many dictionaries retain these two terms as synonyms but we can differentiate two slightly distinct meanings understanding through cooperation "a form of relationship between students consisting of solving problems of common interest, they each contribute actively and effectively" (Dr. Loretta Handrabura, 2003) and cooperation "a form of learning, study, interaction, interpersonal/intergroup depending on time legth and resulting from mutual influences from the agents involved" (Dr. Loretta Handrabura). Panitz stresses that collaborative learning is a personal philosophy, not just a classroom technique. The basic premise in collaborative learning is consensus -between cooperative group members thus avoiding competition where the most equipped outweigh other weaker group members. Collaborative learning is defined by a set of processes that help educational actors interact to achieve a specific goal or develop a final product. Although there are many group type analysis and different insights the fundamental approach in collaborative learning is teacher-centered while classic educational process is student-centered. Therefore, cooperative learning requires joint action of several people (students, teachers) in pursuit of common goals by influences that benefit everyone involved. Collaborative Learning focuses on the tasks involved in relationship but cooperation is the process of achieving those tasks. "(Oprea, Crenguţa - Lăcrămioara, 2003). The same author points out that "collaborative learning integrates cooperative learning." (Oprea, Crenguţa - Lăcrămioara, 2003).

3. MAIN ELEMENTS AND PRINCIPLES OF CL

According to Johnson & Johnson, Johnson & Holubec 1989 and 1998, there are five fundamental elements that characterize this type of learning:

1. Positive Interdependence
According to this principle the group's success depends on the effort in the task by all members. Students are directed towards a common goal, stimulated by a collective assessment and the result is the sum of all efforts.
2. Individual responsability
According to this principle each group member takes responsibility to solve the task.
3. Training and development of social skills
According to this principle young students follow along stimulating interpersonal intelligence, namely the ability to communicate among themselves, to seek and receive support when needed, to provide innovative ideas and solve other conflict situations in everyone's interest.
4. Face to face Interacting
This principle is about seeking direct contact within working group members, also seating arrangement so that they can create small groups of interaction or even software methods by which children would encourage and help each other.
5. Group task division
According to this principle we should reserve time to reflect on how they will solve all the tasks by each individual member and also by the collective group.
The main CL Principles are the following:
1. Enhance the capability of students in retention
2. Increase a positive attitude towards learning
3. Develop social skills
4. Maximum using of different learning styles of all children
5. Performance improvement for the weaker children when they are grouped with the other children.

It is important to bear in mind that progress will not ever stop and new tools and strategies will occur and will refine permanently. Innovation is the precursor to a permanent connection to current ideas.

The collaboration will bring added value to the company and a product (even educational) more valuable to final beneficiaries.

CL reduces stress, makes education seem much easier, it gives freedom of expression and in general makes people happiest.

4. COLABORATIVE VIRTUAL ENVIRONMENTS(CVE)

A. From AI to CSCL
CSCL can be seen in contrast with earlier approaches to using computers in education. Koschmann (1996) has identified an historical sequence of approaches:
(a) Computer assisted training
It was a behaviorist approach that dominated the early years of modern education (1960). In this perspective, learning is seen as a store of facts. The fields of knowledge were organized bottom up type, from basic literacy students who were presented in a logical sequence through computerized training and exercises. Many commercial educational software still follows this approach.

(b) Artificial intelligent systems (AI)

AI started from a cognitive philosophy analysis learning by accurate mental models and potentially faulty mental representations. It thus rejected the behaviorists who said that learning should not be concerned with how students represent and process gained knowledge. This approach seemed particularly promising in the 1970s and created computer models of student response actions (event-based programming) which identified errors in user's mental models.

(c) Logo

This paradigm of the 1980s approach is claiming that sujects must themselves build their own knowledge stimulating the desire for exploration and use of your own judgment (functions, subroutines, loops, recursion, etc.).

 (d) CSCL

CSCL approach was initiated in 1990. It explored how computers could bring students together to learn working together in small groups and learning communities. Motivated by social constructivist theories this paradigm offers opportunities for mutual support in educational construct. Here began AI era that was carried forward by the concept of CSCL. Within CSCL learning focus is on collaboration with other colleagues rather than learning directly from the teacher. This way the role of the computer shifts from mere provision of knowledge - whether in the form of eLearning tutorials or as feedback by IS - to supporting collaboration by providing channels of communication and interaction scaffolding.

The primary form of collaborating is networking based support (email, chat, forums, videoconferencing, instant messaging, social networks and newest 3D environments).

B. Collaborative E-Learning Systems

E-Learning systems that promote learning in a collaborative virtual environment (CVE) can be:
   a) Immersive Simulators
   b) Virtual Learning Environment
   c) Serious Games

C. 3d Virtual worlds

3D virtual worlds are "practical tools for virtual reality" (E. Castranova, 2005). Unlike the paradigm of virtual reality technology that makes use of expensive hardware and creates an artificial environment, Virtual 3D environments are built in environments, something that may offer access to the user itself. Virtual worlds can be accessed by multiple users simultaneously (MMOG - Massively Multiplayer Online Games). A multiuser 3D virtual world (3D MOVIE) is an environment where you can interact via avatars.

Most authors who studied virtual worlds emphasized their persistent character between different working sessions.

 Among the variety of 3D virtual worlds we distinguish: Open Wonderland, Open Qwak, Active Worlds, Vastpark, Multiverse, Worlds, Reaction Grid, Second Life (including open source Open Sim).

3dMUVE is the new media that could be used in education. Persistence feature allows resumption of social interaction such as collaborative learning.

D. Linking learning and 3D virtual worlds

One of the most used LMS platforms (learning management system) is Moodle platform (open source type). It is implemented in various educational institutions and companies that support training. Although this platform is very flexible and allows for

better content management and assessment tools, its weak point is interactivity and interaction between users. Therefore CVE remains more efficient solution for modern training. Why CVE?

(a)Social Learning: students can meet each other (whether part of the same school or from partner schools).

(b)Inspiring Learning: 3D virtual environments allow exploration on real or imaginary locations.

(c)Creative Learning: Some virtual worlds allow students to build easy real or virtual objects. There is therefore unlimited opportunities for collaboration with other students in order to undertake tasks of design and construction.

(d)Relevant Learning: Virtual meetings can be their real-life counterparts and so students will benefit from practicing skills needed in the 21st century in a 3D virtual environment.

5. STUDY CASE

It was designed a lesson about the Merge Sort algorithm applying the principle of Cl. In the lesson are involved a server and a number of mobile devices by the students. The stages of the lesson are the following:

- the students make login in to the server
- the server firstly generates randomly an array of integers, and after divide this array into a number of sub-arrays that are sent to the student devices
- the students try to sort their sub-arrays and try to sent the result to the server
- the module communicating with the server check if the subarray is in the correct order and if OK it send the sub-array to the server
- the server make the merge operation with the received sub-arrays and display the final (sorted) array

In a more suitable version the problem will be solved on much more levels. Some students will have the possibility to divide their sub-arrays into small ones and to send these to their colleagues. These students will make after the merge sort and will sent the merged sub-array to the next higher level.

6. CONCLUSION

Computer systems continue to play a central role in supporting education based on student collaboration. It identifies and develops new methods and theories for wide group collaboration, also new methods of learning and assessment.

Education increasingly use new technologies in learning and computer-supported collaborative learning tends to be accepted as a basic form of learning and would be widely adopted.

The Collaborative Learning seems to be very usefull to be used for teaching fundamental concepts of computer science, especially those where multi-processing or parallel processing may be involved.

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