Collaborative Aspects Supporting Education 4.0

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Abstract: Currently, aspects related with Global connectivity, new communication media, Smart devices are just some of the elements reshaping how we think about work, what constitutes work, and how we learn and develop the skills to work in the future. Education is not distant to this reality, where the concept of Education 4.0 appears. Include Collaborative aspects is one of the most important premises into the new Education process. On this paper we present a set of mechanisms to include collaboration in order to foster education.

Keywords: Education 4.0, Collaboration, Collaborative Strategies.

1 Introduction

Education 4.0 is an approach to learning that aligns itself with the emerging fourth industrial revolution (Diwan, 2017). The digitalization of education also means that learning becomes more collaborative (Wheeler, 2012). The concept related with "user generated content" describes the fact that in times of web 2.0, content rarely is produced by just one single provider of content, but is generated by several users instead. As O´Reilly mentioned, with the proliferation of Web 2.0 services, there has been ongoing discussion about the impact of this "architecture of participation" on individual and

collective social power (O'Reilly, 2007). In higher education, the roles of professors and students change. We moved from an scenario where the teacher has been more or less the only source who provided information, to a current scenario, where students can get basically any information they want from the internet, but can also contribute actively through services like forums, wikis or blogs. The potential is there to switch the students' role from rather passive users of information to creators or generators of knowledge in networked structures.

Collaboration, is an important element in order to achieve the main goals of Education 4.0. Teachers are key actors in this process in engaging their students and industry partners to the development. It is important to notice that all the new responsibilities cannot be added to or embedded within more traditional structures and practices, but some practices and structures will need to be given up (Collazos, Guerrero, & Pino, 2003). However, this change is not an easy task; just putting a group of people around a task does not guarantee a real collaboration, it is necessary to structure activities convey a real collaboration among participants (Kunnari, 2018). On this paper we present a proposal to include collaborative activities in teaching-learning scenarios. Next section depicts some background. Next the model is presented, and finally some conclusions and further work are described.

2 Backgrounds

2.1 Collaborative Learning

Collaborative learning is one of the most remarkable and fertile areas of theory, research, and practice in education. The use of collaborative learning so pervades education that it is difficult to find textbooks on instructional methods, teachers' journals, or instructional materials that do not mention and utilize it. Collaborative learning is a discipline that begins with the understanding of the power and potential of diversity, and an understanding of the essential nature of community. This discipline requires careful teacher planning for regular and rich instructional opportunities that emphasize positive interdependence, simultaneous interaction, individual responsibility, reflection and planning, and a specific focus on the interpersonal and small-group learning skills that students need to learn to use to be successful group participants and learners. Computer-Supported Collaborative Learning (CSCL) is one of the most promising ideas to improve teaching and learning with the help of modern information and communication technology (Stahl, 2002).

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It is common to hear how CSCL can improve some teaching-learning process in the classroom, helping to develop some skills like communication, learn to learn, memory retention, better problems solution. However, just putting a group of students around a task does not guarantee a real collaboration (Collazos C. , Guerrero, Pino, & Ochoa, 2004), so it is necessary to define a process convey collaborative activities among participants (Agredo, Collazos, Fardoun, & Safa, 2017). Many authors have proposed different techniques in order to structure collaboration. Kollar et al. have proposed some mechanisms called collaboration scripts, that have been regarded as scaffolds that aim to improve collaboration through structuring the interactive processes between two or more learning partners (Kollar, Fischer, & Hesse, 2006). Collaboration scripts are the most important design elements in computer-supported collaborative learning (CSCL) and aim to support learning activities by structuring otherwise deficient interactions. A script describes the way students have to collaborate: task distribution or roles, turn taking rules, work phases, deliverables, etc. This contract may be conveyed through initial instructions or encompassed in the learning environment." (Dillenbourg & Jermann, 2007). Computer- supported collaboration scripts or CSCL scripts are an approach to set up and facilitate effective collaborative learning. On a macro-level, CSCL scripts can structure and link lectures, individual and collaborative learning phases in face-to-face or in computer- mediated environments (Weinberger, Kollar, Dimitriadis, & Mäkitalo, 2009). The dynamic mechanisms that govern CSCL scripts include task distribution among groups and roles, group formation and sequencing of activities.

3 Models Proposed

In order to include Collaboration aspects, it is necessary to define and organize some activities. We propose a scheme composed by 3 stages: (1) Set-Up; (2) Define Collaborative activities and (3) Monitoring Collaboration. Figure 1 depicts the model proposed.
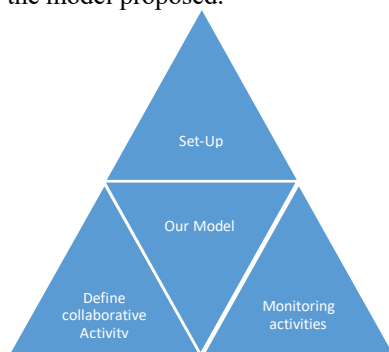

Fig. 1: Model Proposed.

During all activity there are two important roles: Professors and Students. Professor is the responsible person in activities 1 and 2, while the activity 2 must be performed by both Professors and Students.

1. Set-Up: The whole activity starts with the definition of the configuration of conditions that probably will be present during the whole collaboration process. Such a definition influences the elements that will be used in the process and the role of each one of them. A first way to increase the probability that some types of interactions occur is to carefully design the situation where the collaboration will occur. Many studies have analyzed different aspects could influence in the collaboration process. We propose to include some elements based on Bannon's work (Bannon, 1989):

•Kind of activity. It is important to identify the type of activity that will be performed by the members of the group in order to solve a problematic situation. It could, e.g., include tasks such as: puzzle solving, editing a newspaper, writing a letter, etc.

•Nature of participants (collaborators). Specify the types of

 interaction that occur. It could include three types of interactions: peer-to-peer interaction, boss-employee interaction, and employee-computer interaction.

•Group heterogeneity. This covers several independent variables such as: size of the group, gender and differences within the group. Typically, the smaller the group, the more each member talks and the less chance there is someone will be left out. Also, smaller groups require less group management skill and they can usually decide faster

• Gender specifies the male/female group composition.

•Positive interdependences. This is one of the key elements in successful groups.

Based on many studies, psychologists working in education identified positive interdependence as a feature of good learning groups. (Collazos C. , Guerrero, Pino, & Ochoa, 2003) Have developed various ways of structuring positive interdependences in software tools based on the interface design to ensure students think "we" instead of "me".

•Setting of collaboration. Corresponds to the place where the collaborative activity will be held. It could correspond to the classroom, workplace, home or a virtual space.

•Conditions of collaboration. This specifies the kind of

 mediation. It could be physically co-present or computer-mediated.

•Period of collaboration. This specifies the interval time in

which the collaborative activity will occur. It could be specified in minutes, hours, days, weeks, or months.

2. Define Collaborative activity: The person in charge of the activity cannot simply ask students to start the activity and encourage students to work together, but

s/he should specify a collaboration process. Such process could include several activities. At each activity, the group team has to produce something as a result, and team members have some roles to perform. The elements we propose to use to design the collaboration process be the following ones:

•Tasks. This element represents the different activities must

be performed by the group members during the collaboration process. This includes the workflow of both individual and collaborative activities that compose the whole process. It also includes the goals and rules of each task. There are tasks performed by the group associated to the main goal, and others activities done by every member of the group related to the partial goals. On the other hand, the rules of the group activity should be specified. These rules mediate the subject-community relationship, and refer to the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system. These rules permit reviewing boundaries and guidelines for the activity. The activities included in the collaboration process must be designed so that every member of the group has a similar work load.

•Roles. This element determines the tasks (roles) that should be present in the collaboration process. Each group member has a role to play in each activity. The role assigns responsibilities and grants to the users. For example, in a pair reading exercise a student can play the role of reader. Therefore, such a student must to read a section for the partner. After that the reader role must rotate.

•Tools. This issue represents the tools through people can

perform the collaborative activities. These tools must allow collaborators to communicate, coordinate and participate in the process. Members of the group must communicate and coordinate among them in order to accomplish tasks that are independent, that are not completely described or that require negotiation.

•Shared Objects. The objects represent the knowledge that is shared by the group members during an activity. This knowledge can include several resources, such as digital objects, a portion of the user interface, coordination strategies, decisions, goals and awareness mechanisms. For example, the discussion of the strategies to solve a problem helps group members to construct a shared view (shared object) of their goals and tasks required to be executed. This shared view can improve the coordination during an activity, because each member knows how his/her task fits into the global team goals.

3. Monitoring: The last aspect to consider is related to the strategy that can be used to monitor and maintain the collaboration among members of the group. Such activity could be conducted by a cognitive mediator or by the team members. There is no guarantee interactions

among team members actually occur. Hence, some external regulation is needed to satisfy the occurrences of those kinds of interactions. One way to provide that kind of regulation is through the cognitive mediator. The role of mediator will not be to intervene at the task level, but to guarantee all the group members participate, and to frequently ask questions such as: What happened? What does it mean? The role of the cognitive mediator is to maintain the focus of the discussion, guiding students through the knowledge construction process. As the collaboration goes on, the state of interaction is evaluated. Remedial actions may be proposed to reduce discrepancies between these states.

4 Conclusions and Further Work

We find ourselves on the educational frontier that demands an educational system that is more flexible, open, and adaptable to the learning conditions of the students. This force us to search for new methods that will aid us on the development of our students. In these reforms, technologies supporting computer-based processes and communications between persons have played an increasingly relevant role, hereby computers and the Internet became crucial tools for development and change. Society is changing rapidly evolving in the areas of knowledge and more specifically in the area of technology. This change affects the way people work and learn. There has been a lot of emphasis of the inherently cooperative nature of the processes and the businesses that have materialized by organizations made up of people Understanding group dynamics and the collaborative process of decision making and learning in-groups are both interesting research fields and the basis for new tools to support a better teaching learning process. In the case of collaborative activities, performing well a task implies not only having the skills to execute the task, but also collaborating well with teammates to do it. In order to better support collaboration in Education 4.0, aspects related with collaboration need to be included. As future work we are going to define a set of guidelines in order to use the model in an easy way, also, we want to use the model and validate it in different scenarios in order to specify some collaboration patterns.

Conflicts of Interest
The authors declare that they have no conflicts of interest to report regarding the present study.

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