Supporting the Composition of Effective Virtual Groups for Collaborative Learning

Daradoumis T., Guitert M., Giménez, F., Marquès, J.M. and Lloret, T.
Open University of Catalonia
Department of Information Sciences
Av. Tibidabo 47, 08035 Barcelona, Spain
E-mail: adaradoumis@uoc.edu
{mguitert, fgimenezp, jmarquesp, tlloretg} @uoc.edu

Abstract

In this paper we explore the different processes involved in constructing effective virtual collaborative learning groups, especially why, when and how these processes affect group formation and to which degree they guarantee the creation of well-functioning and successful learning groups. A student can benefit from collaborative learning only if he/she participates in supportive learning teams. For this reason, our research interest is to aid and provide the means for the configuration of learning groups that are appropriate for different learning situations. A key issue in this process is to make the educational function and structure of collaborative learning groups clear, by identifying and making explicit both the individual and group learning and social goals, as well as the relationships, interaction processes and roles that determine the nature and idiosyncrasy of the group.

1. Introduction

Supporting quality teaching and learning has been one of the critical issues in distance learning. Virtual learning environments give students the chance to interact in small or large groups of learners and become active members of an online learning community. Collaborating in small groups may constitute a powerful means for promoting and enhancing learning and social interaction. However, the effectiveness and success of a group of learners depends on a variety of issues during its lifecycle. An important issue to consider is group formation: the factors that influence and promote the creation of a group and the processes that take place and govern and condition the group construction.

The composition of effective peer groups for collaborative learning becomes even more important when these groups have to be constructed from “scratch”, when their members do not know each other and when they have to collaborate at a distance, in a virtual learning environment, in order to elaborate a learning activity.

From the one hand, the ultimate aim of a learning group is to achieve the common learning goal of carrying out a learning activity successfully and, from the other hand, to pursue a private benefit of its members by promoting learning and enabling better learning outcomes.

The virtual learning environment is provided by the Virtual Campus of the Open University of Catalonia (http://www.uoc.edu), a large and complex organisational learning environment that offers an innovative pedagogic model for distance learning and teaching, where the communicative process is crucial. Within this environment, collaborative learning is carried out through a specialised groupware tool, the Basic Support for Cooperative Work (BSCW) system [1].

This paper describes an empirical study of different collaborative learning situations that require different settings and approaches as regards group formation, consolidation and engagement for effective collaborative learning interaction. In particular, the goals of the case study motivating this research are:

1. To explore the different processes involved in constructing effective virtual collaborative learning groups, especially why, when and how these processes affect group formation and to which degree they guarantee the creation of well-functioning and successful learning groups.
2. To support and provide the means for the configuration of learning groups which are appropriate for different learning situations.
3. To make the educational function and structure of collaborative learning groups clear, by identifying and making explicit both the individual and the group learning and social goals, as well as the relationships, interaction processes and roles that determine the nature and idiosyncrasy of the group.

This paper is organised according to the goals set above. First, we describe the general approach followed by setting out the key issues related to the group formation process. Then, we present and explore different scenarios of collaborative practices. And, finally, we discuss the
results and implications of the preliminary study and set the stage for the next phase of this research.

2. Group formation as a dynamic collaborative process

Our research relies on case studies concerning collaborative learning and work in several undergraduate courses in a virtual learning environment. Based on the implementation and analysis of such educational practices with clearly differentiated goals, contents and methodologies, our research enabled us to explore several possibilities that are related to the main objectives we set above. From a methodological point of view, this allowed us to identify that the lifecycle and progress of learning groups in a virtual environment goes across four critical phases (or stages) that require defining specifications which are quite different from those applied in individual learning in virtual environments. These phases are: Group formation, consolidation, development and closing (see [2]).

The realisation of the four phases can be more or less evident or applicable depending on the learning goal and methodology of the course at hand. All phases prove to be critical for a virtual learning group since they represent moments in which important decisions have to be taken and changes may be effected as regards the learning process and group dynamics.

This paper focuses on the first phase, group formation, by exploring the conditions under which effective collaborative learning groups are built in different learning situations.

Many recent research approaches in Computer Supported Collaborative Learning and Work (CSCL and CSCW) have focused more on the development of ways of observing and assessing collaborative knowledge building (see [3], [4], [5], [6], [7] and [8]). Although there exist a few well developed approaches that concern group formation and groupware's life (as described by [9] and [10]), several of the goals and aspects mentioned above remain unclear.

Our approach looks at group formation as a dynamic collaborative process. It considers it as one of the basic elements of the group's lifecycle and an important factor for the group's success. To implement it, we propose a four-step scheme that consists of well-defined processes whose purpose is to engage the students in activities that lead to the creation of well-functioning learning groups. Figure 1 shows the general approach followed, while Table 1 presents the details of each process involved.

Given a 15 week lecture period for a semester course, the group formation phase may take in average about 8 days to be completed. In that case, Table 1 indicates the suggested time frames for each process.

A culture for collaboration must be based on relationships such as trust, motivation, encouragement, mutual support and openness. Since people are in general reluctant to be engaged in a shared experience when they do not know each other, our approach proves to be effective, since it gives students the time and the opportunity to meet, interact in an informal setting, begin to develop relationships, evaluate and learn each other’s interests and intentions well enough to figure out the most adequate collaborators to form a group. Taking time to build this “social capital” at the beginning of the collaborative practice increases the effectiveness of the team later on. Even more, it was proved that it encourages some less able or less enthusiastic students to join good groups, a fact that could be very hard for them otherwise.

Experience with group formation in different learning situations revealed more benefits if this phase is carried out adequately, which in turn increases the probability of achieving well-functioning and successful collaborative learning groups:

1. The initiation and negotiation processes allow students to increase their understanding of virtual collaboration and get a feeling of both possible benefits and problems which are intrinsic in it.
2. The introduction process encourages students to set clear individual goals and expectations while fomenting openness and honesty as regards their capabilities, skills and attitudes to collaboration.
3. This initial level of collaborative expertise gives students both the motive and the feeling of confidence and readiness to tackle with subsequent collaborative phases better.
4. Students become familiar with a collaborative learning technology before they start real work.

Figure 1: The group formation phase
Table 1: Description of the group formation processes (average duration time: 8 days)

<table>
<thead>
<tr>
<th>When</th>
<th>Why</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>To initiate students into the new experience of virtual collaboration and to enable them to understand the notion and function of collaborative learning groups.</td>
<td>All students collaborate together to resolve a specific case study about what they need to know and do in order to construct effective virtual collaborative learning groups.</td>
</tr>
<tr>
<td>Introduction</td>
<td>To provide both one's own and other relevant information in order to enhance a deeper knowledge of each other and to promote a better interaction.</td>
<td>Students should work out a personal report with important information, such as personal data, expertise level, work pace, available working time, temporal coincidence, goals and attitudes to collaborative learning, social aspects of collaboration, and previous experience in groupware.</td>
</tr>
<tr>
<td>Negotiation</td>
<td>To form a learning group that satisfies both individual and group goals or to search for an open group that fits better one’s personal goals and needs.</td>
<td>Each student initiates a negotiation process either with individual candidate members whose characteristics match with his/her own ones in order to form a reliable and effective learning group or with a possible open group in order to become an active member of it.</td>
</tr>
<tr>
<td>Group Proposal</td>
<td>To inform and ask the tutor to approve the definite formation of a learning group and the initiation of the next collaborative phase.</td>
<td>A member of the recently constructed learning group informs the tutor about the group’s constituent members, facilitates each member’s data and asks for its final approval.</td>
</tr>
</tbody>
</table>

3. Supporting effective group formation in different learning situations

Several undergraduate university courses provided us both the context to apply our approach and the possibility to analyse and evaluate the results. In fact, the implementation of the group formation processes may show divergences among the different experiences, since it depends on several factors such as the learning goal of the course, the proposed methodology, the homogeneity or interdisciplinarity of the learning groups, and temporal criteria such as the time given to carry out the collaborative learning process. These factors dictate which group formation process is to be given the highest priority; for instance, we may reinforce the negotiation process in order to achieve groups with clear differentiated roles and organisational structure, or instead let the tutor itself arrange and create learning groups if time restrictions prevail. Although the most of the experiences were implemented on the BSCW system, our approach was also tried using the Virtual Campus of the university as the basic collaborative tool; see [11] for more details. In this paper, we are going to illustrate the group formation process that took place in a Case-based collaborative learning practice.

3.1 Achieving well-functioning virtual groups in a case-based collaborative learning situation

The purpose of this experience was to enable the collaborative realisation of a case study in the course “Business and Information Technology”. The interdisciplinary nature of this course allowed the participation of 40 Computer Science (CS) and 98 Business Administration (BA) students, 138 in total. The fact that we had to create 23 groups, assigning 4 BA and 2 CS students in each group, determined the composition of groups and the setting of a high priority to the negotiation process. Figure 2 shows the different processes involved in the group formation phase as implemented in the BSCW system.

In this experience, there were 21 students who did not really follow the group formation process. A questionnaire revealed various reasons: 7 of them were incorporated late in the course; 5 students simply did not realise the importance of taking part in the process; 5 more were not registered on BSCW on time; finally, only 4 students proved to be just lurking and not being enthusiastic in joining the process. In that case, the tutor had to distribute the students randomly forming 4 groups. All these groups failed to achieve the learning goal set by the case study.
In particular, one of the groups was not able to start the collaborative practice at all. In another, a couple of its members made some very initial efforts to work together but they rapidly abandoned any further attempt. The other two groups reached a bit further, but in fact there was no real collaboration among their members; some members did not participate properly. After some time, the tutor had to merge the two groups in one that involved only the active members of the two. The newly formed group could finally accomplish the learning goal but the resulting outcome was far from excellent.

Instead, all other groups who had adequately followed the group formation approach proved to be effective and had successful outcomes, showing that they were able to benefit the most from collaborating and learning together.

4. Conclusion: Implications of the approach and future research

Analysis and evaluation of the different collaborative learning situations allowed us to draw interesting insights about the structure and function of effective peer groups. In general, our research showed that a satisfactory culmination of the group formation process constitutes an important prerequisite for the success of a collaborative learning experience. More specifically, our analysis indicated that effective completion of the group formation process sets the rules and the conditions that should hold in order to create an appropriate context that favours quality of learning in a group and helps the learners to receive the maximum of educational benefits. At this stage, we have just identified the following parameters that make the educational function and structure of collaborative learning groups clear while, at the same time, influence, support and enhance the group learning process. These parameters concern the clear identification, mutual acceptance or consolidation of the following elements:

- Individual and group learning and social goals.
- Relationships that hold among group members; analysis of student interaction during the group formation phase identified that there exist at least the following types of relationships which characterise group interaction and may yield effective (or ineffective) group learning experiences: confidence, commitment, responsibility, motivation, acquaintance, coordination, support, encouragement, openness, and equality in contribution, responsibility and opportunity.
• **Interaction process**: includes all those elements that promote interaction such as the communication mode (synchronous, asynchronous), information flow, knowledge management, involvement level and the specific roles chosen by the group members.

• **Member profile**: capabilities, skills and specific characteristics (beliefs, needs, desires and attitudes).

Future work includes a more detailed analysis of the next collaborative phase, the *consolidation phase*, where all the above parameters are explored and determined at a much finer grain. The aim of this analysis is the elaboration of a taxonomy and a detailed description of the relationship between the different kinds of the above influencing factors. This will provide a better understanding of group interaction and determine how to best support the collaborative learning process.

**References**


