Before the Team project: Cultivate a Community of Collaborators

Deborah LaBelle

DML19@psu.edu

Information Science and Technology

Penn State Delaware County

25 Yearsley Mill Road

Media, PA 19063

610-892-1343

Abstract

The team project has become an essential component in undergraduate education, especially in the information science and technology curricula. Often, the students are also required to utilize a "Collaborative Learning Tool" such as Blackboard ™ to carryout their collaborative activities. However, many students, dare I say the majority of students, cringe at the mere mention of a "Team Project". There are many reasons for this reaction, but one reason is that the students are not prepared to collaborate. They are not prepared to collaborate with each other, and they are not prepared to use the collaborative learning tools effectively. The research in collaborative learning has indicated a need for students to learn how to collaborate, and to engage in non-task interactions to build socio-emotional connections that lead to effective collaboration.

This paper explains a few project assignments that I use to create a collaborative work environment both face-to-face, and online, that encourages social interactions alongside task interactions.

Keywords: Collaborative Learning, Team Projects, Social Interactions, CSCL

1. THE NEED FOR SOCIAL INTERACTIONS BETWEEN COLLABORATORS

The benefits that students gain by collaborating in groups to achieve a common output such as a research paper or project are strongly supported in the research field of Computer Support for Collaborative Learning (CSCL). Consequently, there is an increasing demand for undergraduate curricula to require that students learn to work in teams and to collaborate on course assignments in small groups. To support this endeavor, colleges and universities invest in software designed to support collaborative learning. The software tool, however, is but one component in the collaborative learning process. Computer supported collaborative learning activities take place within a complex relationship between the subject matter, the individual learner, the group to which the learner belongs, and the technology.

Recent research in CSCL demonstrates an appeal for preparing students for working in a collaborative learning environment. Educators must prepare the collaborator for a positive and rewarding collaborative experience in a face-to-face and in an online environment. In addition, the skills gained should help him or her to become an effective collaborator in future collaborative groups and in the practice of life long learning.

Guzdial (1997) suggest that "working collaboratively is a skill and a perspective", and that "students need to develop skills to further their ability to collaborate". We should not assume that if students are grouped together in a collaborative setting, and are given computer support for building knowledge needed to solve a carefully developed problem that they will collaborate effectively, or successfully.

Carroll (2003) studied the use of notification tools in a java based collaborative learning tool called "Virtual School". The notification tools were designed for collaborators to be made aware of each other's activities in a task oriented learning objective. The study analyzes the effects of the notification tool on awareness by analyzing breakdowns in awareness. The study indicated *"Breakdowns in group factors were caused by misperceptions of group member abilities, inadequate trust and non-collaborative patterns of goal-related activity."*

Carroll (2003) claims that the system needs to provide some way for collaborators to "get to know each other more easily." He further suggests that chat, use of avatars, and integrated histories of all interactions may provide support in this direction. In addition, he states, "the incentive to collaborate has to be structured within the groups."

This research maintains that the key to developing functional learning groups is in the social interaction between its members. CSCL environments should be designed for social encounters as well as task-oriented learning objectives. Such social encounters are non-task oriented such as casual conversation. Non-task or "off-task" conversations provide an avenue for impromptu encounters with group members, thus catalyzing a socio-emotional connection between the members. Cooperative learning research (Johnson & Johnson 1994) has illustrated that positive social interaction among group members is vital to real collaboration.

Kreijns (2003) has identified two important "pitfalls" in CSCL environments. They see the two pitfalls as taking social interaction for granted and restricting social interaction

to cognitive processes. All too often, we ask our students to perform in a collaborative learning environment and we focus solely on the academic task and do not take into account the socio-emotional and socio-cultural requirements for the collaboration. In turn, our students focus on "getting the job done". As a result, we are teaching our students simply to coordinate tasks. They work independently to complete their assigned task, and then come back to the online or face-to-face environment to join their independent learning outcomes together into one complete object.

Kreijns has suggested four areas of research to consider assuaging the pitfalls mentioned earlier in this paper. The four, not necessarily independent categories include research on methods of collaborative learning, the role of the instructor and/or learners, the interactivity affordances in web-based CSCL environments, and social presence. He also posits that fostering cohesion in CSCL is more difficult than maintaining it. These suggestions should encourage CSCL researcher to pay great attention to the collaborative method of learning as part to the entire four-year undergraduate education experience. We should begin in the first year by fostering cohesion among groups who anticipate working together, and work to maintain it throughout their college career.

Educators in undergraduate institutions need to cultivate group unity in collaborative learning environments among the first year students in order to build strong collaborative skills. However, before we can prepare students to become effective collaborators, we must identify the attributes of successful collaborators. Some of the components I have gleaned from the research and my own observations of a successful community of collaborators are:

- A sense of trust that allows members to share their personal thoughts and ideas, and to move freely from leader to listener or vice versa
- Ability to reflect, individually and collectively on the learning process and outcomes both formative and summative
- An awareness of progress in self understanding that leads to an

understanding of the importance of the group learning experience
- A commitment to self and others to achieve the common goal

Trust and commitment can be developed if socialization is encouraged (Rovai, 2001). Trust and the ability to reflect develops with a history of working and learning together. History, however takes time. We need to consider ways to expedite the process of creating a group history. Carefully structured activities that encourage socio-emotional interactions may accelerate history.

Johnson and Johnson in their seminal paper on cooperative learning (Johnson & Johnson 1994) encourage the formation of small groups. They state, "Caring and committed friendships come from a sense of mutual accomplishment, mutual pride in joint work, and the bonding that results from joint efforts." In addition, they list three basic interactions among student learners:

- Compete to see who is "best"
- Work individually without interacting with others
- Work together, cooperatively – with a vested interests in each other's learning

Any of the three interaction types listed above may be implemented in the collaborative learning environment. Real collaborative learning, however, requires the third interaction type. (Johnson and Johnson, 1994) Simply assigning students to groups does not foster a vested interest. In addition, students come to college from a wide range of home environments – culturally and socially. They have different levels of technological skills. Creating a collaborative learning community from a group of diverse individuals takes instruction and guidance if we expect them to be successful. The guidance must foster a vested interest and the group must see itself as the stakeholder in the learning process. Social interaction may be the key to intimacy, history, and building a community of learners who share a vested interest in each other's learning.

Finally, I propose that students must have the following skills to be a successful collaborative learning group:

- Relationship building skills that foster and maintain mutual respect and trust among group members and allow socio-emotional connections to grow.
- Communication skills including skills to create and maintain a cohesive communication structure, and skills to develop communication rules that involve conflict management
- Online communication skills that help to develop a common language and promote deep discussion, idea sharing, and reflection. Response time, choice of asynchronous vs. synchronous discussion, and the effective use of time online should be understood
- Technology skills – A common understanding of the effective use of the collaborative learning tool, a common understanding of knowledge gathering and basic skills of information sharing via the technology (Internet, discussion board, chat, email, etc.)

Competence in the technology enhances a student's confidence in communicating with other members of the group. Just as a common language of context is central to the successful community of practice, a common understanding and command of the technological tool is vital to community of collaborative learners.

Opportunities for group members to communicate socially will help group members to develop good communication skills both offline and online. In turn, they will share technical knowledge and develop trust and commitment as their socio-emotional connections grow. This is especially true for students who are commuters or only see each other in class.

2. STRATEGIES FOR PREPARING COLLABORATORS

Team building exercises are often the first assignment given to a group of students that are about to embark on a collaborative learning experience. A typical exercise may require the students to talk to each other about their likes, dislikes and personality. In addition, the group develops a group title and a final exercise may require each student to demonstrate what he or she knows about other members of the group. This type of exercise is designed to promote

group cohesion and begin a socio-emotional relationship between the group members. It is a popular exercise, as it requires a minimal time taken from "real" course work. Other team building exercises require students to develop rules for team members, and consequences for breaking the rules. While these exercises are important to good teamwork, they do not necessarily encourage good collaboration.

I propose that we tightly couple the team building exercises with the tasks, and in so doing, lengthen the time spent on the team building exercise, covering course content simultaneously. The social interactions built in to the project task should encourage task and non-task communication and in turn will encourage technical skills and build strong relationships among all group members.

A group needs leadership to manage and coordinate a collaborative project and guide the task and non-task oriented discussions. Appropriate and calculated collaborative projects that deeply engage the members in the process of collaboration will help to develop common ground among the members of the group and build a socio-emotional bond between members.

Following are a few strategies to facilitate social interactions:

1. Structure the assignments to foster social interactions and build history
   a. Assign projects that focus on process, not outcomes
   b. Assign projects that require members to rely on each other for technological information (regarding task and collaboration tools)
2. Encourage social-interactions between teacher and students – be a role model
   a. Ask the students questions about their hobbies and interests as they may relate to their studies
   b. Create a discussion board topic just for social interactions
3. Encourage asynchronous interactions to share technical and project knowledge
   a. Design asynchronous discussions to include everyone in the group
   b. Integrate the use of the collaboration tool whenever

appropriate – discussion board, chat, file transfer, email etc.
4. Encourage students to recognize each other's value to the project
   a. Encourage students to share ideas in regular synchronous small group discussion - CSCL tools may be used to facilitate time and schedule constraints
   b. Contributions of individuals should be highlighted, each collaborator should have a unique "responsibility" or "skill" that is recognized – teacher may play a vital role in accomplishing recognition for each student
5. Provide time for reflection
   a. Provide opportunities in class to facilitate reflection of group progress
   b. Teacher must provide timely feedback to electronic and face-to-face questions from students
   c. Share ideas between groups where appropriate

The strategies listed above focus on fostering interactions. They should help to develop communication skills, relationship-building skills and technological skills while working on task.

In this paper, I will discuss how some of the projects I have assigned attempt to satisfy the strategies above and have built strong learning communities among the IST students at Penn State Delaware County. It has been my observation that these projects encourage non-task interactions and result in stronger socio-emotional connections among the students. Developing good working relationships between students at an early stage, say in the first year, should help to maintain collaboration for the duration of the students' education.

3. THE COLLABORATIVE PROJECT

The key to all of my project assignments is to design them in such a way that the students look forward to sharing their ideas. In a programming assignment, I ask the students to produce something that reflects their personal interests. This could be a hobby, a family business, a future goal etc. For a research paper, I try to develop an assignment that allows each student to find

an area in the research that interests him or her personally. The students typically work on their project either individually or in pairs.

One of the more difficult aspects of these types of assignments for the teacher is that there can be as many different projects as there are students in the class. In a programming or database design class, however, the projects are technically similar. The projects allow the student to demonstrate his or here technical knowledge learned in class in various ways. A benefit of the variety is that it virtually eliminates copying. The personal aspect of the project keeps the individual student focused on succeeding. At the same time, the students understand their fellow student's need to succeed as well. This understanding trickles into a willingness to help each other work out difficulties in their projects and to learn how to collaborate with the online tools as well, as they want to communicate outside of class.

In an object oriented design course that uses Java, the students are required to design a system to demonstrate their knowledge of object oriented design techniques and to implement their design in a Java program. They use UML to illustrate their design on paper and to discuss their design ideas with me, and others students in the class. A common project in a class such as this may involve interacting with a savings or checking account; create an ATM interface. To make the project have more personal meaning I ask the students to design an interactive system that is of some special interest to them. Students come up with very interesting ideas, such as Dating Kiosks, Consulting Management systems, and Real Estate Kiosks. Recently, a student developed a prototype to interact with her insulin-monitoring device. I ask the students to post their ideas in an online discussion board. This provides some insight for students that feel they do not have any "good ideas". I also ask the students to make a brief comment to each other's ideas on the discussion board. Now the students are using the collaborative tool to share ideas and to get to know each other. I also monitor the discussion board and make comments. I want the students to see that I too am a member of the group.

After all the ideas are posted on the discussion board, students give a brief in-class overview of their project idea and tell why they chose their topic. This gives everyone an opportunity for face-to-face discussion and to clarify anything mentioned online. I have a class size of 24 so the in-class discussions usually take a week to complete. For a larger class, the face-to-face discussion could be limited. This discussion period encourages social interaction because their project ideas expose their personal interests. The discussions also help me to get to know the students; I have discovered a classical guitarist, a motorcycle buff and an expert on lilies that I would never have suspected had I not assigned this type of project.

As the projects develop, the students give updates on their progress, both online and if time permits, in class. Students show a great deal of interest in the features of each other's projects. Slowly, small groups of students with similar technical and/or aesthetic interests emerge and begin to share ideas and know how. At this point, I encourage them to use the CSCL tool to form small online work groups to facilitate communication and idea sharing. I have noticed that they also share email addresses, AOL Instant Messenger screen names, and phone numbers. I continue to monitor their online discussions and encourage interactions between group members. Their informal discussions about their individual solutions to the project lead to non-task interactions and the students form social bonds, but beware, the online discussion needs nurturing. The use of the collaborative tool needs to be encouraged whenever the opportunity arises. The actual tool should become ubiquitous as learners build their collaborative skills and encourage each other to interact.

The design of this assignment gives the students an opportunity to get to know each other personally, and to build a trust that allows them to share knowledge about task and tools to get the task done. The change in personality of the class as a whole goes from one of 24 individual students to a community of learners. Once the students have a feeling of community, I see that they enjoy working together, and many continue collaborate in future courses.

Groups that always meet face-to-face have more opportunity for natural non-task interactions and hence may be more likely to enjoy their group experience. Non-traditional or commuter undergraduate students do not always have time to meet face to face. Using a CSCL tool helps bridge the gap between in-class and out-of-class discussion time.

Building socio-emotional connections between people in online groups takes time. Designing a collaborative project that encourages non-task interactions may be one way to help facilitate the connections needed to build a community. Students that feel comfortable engaging in non-task interactions are more likely to communicate with each other more often, thus building online communication skills. In turn, they will share more task information and continue to build a better working relationship.

4. OUTCOMES AND OBSERVATIONS FROM THE COLLABORATIVE PROJECT

Although I did not perform a quantitative study on the courses which I applied my technique for building collaborators, this section will report on results for grades, completion of projects, student feedback on the projects, and my observations.

Over the past four consecutive semesters, I have been tweaking my collaborative project assignments in an attempt to produce a better group of collaborators. I have applied the techniques I described above in two different programming courses, VB.NET and a Java programming course. There are approximately 24 students in each course. The first semester I assigned groups before the project analysis phase. Of the 12 groups, most complained that one student coasted while the other did all the work. In the following semester, I assigned the groups after the initial project analysis phase began. I still received complaints of coasting, and noticed a significant amount of disinterest in the project by many of the minor contributors as the semester progressed. I believe this was due to their lack of technical knowledge that left them feeling unimportant to the success of the project.

In my third attempt to build a community of students willing to work and share knowledge, I required that each student produce their own project, but work with other students that had similar project requirements and/or users so that they may help each other accomplish the task of completing their individual project.

Hence, in the past four semesters I have evolved my method of forming groups to facilitate more social-interactions that would build better relationship and technical skills between the students in the class as a whole. A brief description of each method follows:

Random Groups – students were asked to form groups, they usually asked the person sitting next to them to be their partners. Each group produced one project. I created discussion boards on which students could contribute and share ideas.

Interest Groups – students devised an idea for a project individually, students with similar project ideas formed a group and worked together to produce one project. I generated small group discussion boards on the CSCL tool.

Loose Groups – students devised an idea for a project individually, students with similar project ideas formed a group to discuss issues involved in developing their individual project. I mandated the use of discussion boards for students to share ideas. I took suggestions from students to create additional discussion boards and drop boxes.

Table 1 describes the methods used in each semester and some results, including issues raised by students and my own observations. The most striking difference between the semesters is the number of completed projects. The "Loose Groups" of students had more opportunity for social interaction, and learned each other's first name within the first few weeks of class. They enjoyed working on their individual projects but they also worked closely to share common ideas and technical knowledge.

Table 1. Comparison of Outcomes

Method	Term	Approx % Completed Projects	Student Issues/Comments	My Observations
Random Groups	FA02	60	-Coasting -major contributor wanted to "fire" their partner	-Little discussion between groups -Only a few groups used the CSCL tools
Interest Groups	SP03	75	-Coasting -Minor contributor felt they did not have enough opportunity to contribute	-Students lost interest, diverged from group work, convened with me more then their partner
Loose Groups	FA03	90	-No Coasting -Student liked working on something of their own interest to help them learn the material -Liked sharing ideas with others	-Students learned each other's names quickly -Communicated within and outside of own group -Requested additional discussion boards
Loose Groups	SP04	90	-No Coasting -Were encouraged by other's ideas -Told me "You made us think"	-Several groups expressed interest to continue their project in future, many did. -Used discussion board frequently

5. CONCLUSION

I have tried this technique of designing project assignments that emphasize personal interests and encourage social interactions in several of my courses. It works well in most programming courses, but it can also be used to study for exams. Students post topics on the online discussion board, create questions for each other and submit sample answers. I participate as well, encouraging a good answer and steering a

wrong answer into a new direction. The final discussion board can be extracted and converted into a study document. The most important outcome is that the students get to know each other while learning how to collaborate both face-to-face and online. They share a lot of knowledge that helps to create a more level playing field regarding subject matter and use of the collaborative tools. In subsequent projects or courses, they are more comfortable communicating with each other, and hence are better at collaborating on a specific team project.

References

Carroll J. M., D.C. Neale, P.L. Isenhour, M.B. Rosson and D.S. McCrickard, 2003, "Notification and awareness: synchronizing task-oriented collaborative activity.", International Journal of Human-Computer Studies. Vol 58, No. 5, pp. 605-632.

Contreras-Castillo J., J. Favela, C. Pérez-Fragoso and E. Santamaría-del-Angel, 2004, "Informal interactions and their implications for online courses", Computers & Education. Vol 42 No. 2, pp. 149-168.

Crook C., 1998, "Children as Computer Users: The case of Collaborative Learning.", Computers and Education. Vol 30, pp. 237-247.

Guzdial M., C. Hmelo, R. Hubscher, K. Nagel, W. Newstetter, S. Puntambeaker, A. Shabo, J. Turns, J.L. Kolodner, 1997, "Integrating and Guiding Collaboration: Lessons Learned in Computer-Supported Collaborative Learning Research at Georgia Tech", Proceedings in CSCL 1997 Conference, December 10-14, Toronto, Ontario.

Johnson R.T. and D.W. Johnson, 1994, "Creativity and collaborative Learning", Brookes Press. Baltimore, MD.

Katz S. and A. Lesgold, 1993, "Collaborative Problem-Solving and Reflection in Sherlock II", Proceedings of the Workshop on Collaborative Problem Solving: Theoretical Frameworks and Innovative Systems, August 1993, Edinburgh, Scotland.

Katz S. and A. Lesgold, 1994, "Implementing Post-problem Reflection within Coached Practice Environments", Proceedings of the East-West Conference on Computer Technologies in Education, September 19 – 23, 1994, Crimea, Ukraine.

Kreijns K., P.A. Kirschner and W. Jochems, 2003, "Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: a review of the research", Computers in Human Behavior, Vol 19, No. 3, pp. 335-353.

Kreijns K., P.A. Kirschner, W. Jochems and H. van Buuren, 2004, "Measuring perceived quality of social space in distributed learning groups", Computers in Human Behavior, In Press

Lahti H., P. Seitamaa-Hakkarainen and K. Hakkarainen, 2004, "Collaboration patterns in computer supported collaborative designing", Design Studies, In Press.

Luckin R., 2003, "Between the lines: documenting the multiple dimensions of computer-supported collaborations", Computers & Education, Vol 41, No. 4, pp. 379-396.

Martínez A., Y. Dimitriadis, B. Rubia, E. Gómez and P. de la Fuente, 2003, "Combining qualitative evaluation and social network analysis for the study of Classroom social interactions", Computers & Education. Vol 41, No. 4, pp. 353-368.

Michinov N., and C. Primois, 2004, "Improving productivity and creativity in online groups through social comparison process: New evidence for asynchronous electronic brainstorming", Computers in Human Behavior, In Press.

Rovai A.P., 2001, "Classroom community at a distance: A comparative analysis of two ALN-based university programs" Internet and Higher Education, Vol 4 pp. 105-118

Strijbos J.W., R.L. Martens and W. M. G. Jochems. 2004, "Designing for interaction: Six steps to designing computer-supported group-based learning" Computers & Education. Vol 42, No. 4, pp. 403-424.

Suthers D.D., C.D. Hundhausen and L.E. Girardeau, 2003, "Comparing the roles of representations in face-to-face and online computer supported collaborative learning", Computers & Education. Vol 41, No. 4, pp. 35-351.