Editor's Note: Collaborative communication tools are not limited to facilitation of learning; they provide opportunities for students to participate in every stage of the education process from goal setting to evaluation. The lead article in this issue by Daithí Ó Murchú addressed new student roles as self-learner, team member/collaborator, and knowledge manager/leader. He also listed new teacher roles and how these align with, exist in tandem, or overlap student roles. This paper is an excellent example of Murchú's findings. In this study, the learners collaboratively design their own course, select tools for implementation, participate as learners, and evaluate the outcomes.

What Makes an Online Group Project Work?

Students’ Perceptions before and after an Online Collaborative Problem/Project-Based Learning (PBL) Experience

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Abstract:

In this paper, we examine factors that make an online group project work. We asked the students in an online class to share their past group experiences at the beginning of the semester. We then used the categories derived from the students’ responses as baseline and asked the students to talk about their online group experiences at the end of the semester after they completed the online problem-based learning projects. We compare the responses, analyze similarities and differences, and provide suggestions on what makes an online group project work.

Introduction

In this paper, we examine factors that make an online group project work. We had several questions before we conducted the study:

1. Is doing a group project online more difficult than doing it face-to-face? To what extent is face-to-face meeting important for a collaborative group project?

2. Do students experience more anxiety due to the lack of co-presence in online group collaboration? If so, how do students overcome it and succeed in their projects?
3. Are there opportunities that are important for the success of online group projects which are not presented at face-to-face group projects?

With these questions in mind, we asked students in an online class to share their past group experiences at the beginning of the semester: what they liked or disliked about a past group working experience, and what they considered as important factors that would make a group project meaningful for their learning. We then used the categories derived from students’ responses as a baseline and asked the students to talk about their online group experiences at the end of the semester after they completed their online problem-based learning projects.

In this paper, we compare the responses, analyze the similarities and differences, and provide suggestions on what makes an online group project work based on the students’ experiences and perspectives.

**Conceptual framework**

**Problem-based Learning (PBL) and Collaboration**

PBL has been characterized as an example of constructivist thinking (Duffy & Cunningham, 1996). One of the ways it implements constructivist principles is through the design of educational activities within an authentic situation that embodies knowledge and skills that students need to learn. This authenticity stimulates students to go beyond memorizing facts. It encourages them to perform like active practitioners in the field to analyze, evaluate and integrate the facts and skills into a cohesive approach to solve problems that the situation presented.

Consistent with its goal of making learning a mirror of practice, most PBL implementations encourage collaboration, cooperation, and communication among learners during this process. Learners bring together their previous experiences, skills and current understandings into a negotiation process that should contribute to strengthen their response to the learning situation. The process, which includes consultation of sources of information, negotiation of understandings, and design and refinement of the solution, is facilitated by continuous reflection on content and process. It is improved on an ongoing basis by input from multiple sources and perspectives of assessment. The result constitutes an informed response of students to address the situation.

Collaboration in learning has been defined as “working together to accomplish shared goals” by Johnson & Johnson (1996). These authors emphasize several important aspects that characterize effective group work: positive interdependence among group members to achieve a group goal, group and individual accountability, interpersonal skills, the ability to self monitor group work and ensure consistent progress towards the
goal, and the ability to discontinue patterns of behavior that impede the progress. In addition, Johnson & Johnson (1996) incorporate face-to-face interactions as one of the defining aspects of group work. This last point constitutes the biggest challenge for the group of students who participated in our study because most students were not able to meet face-to-face in this online class. The online environment, with various computer-mediated communication (CMC) technologies, provides new opportunities as well as challenges. It is the goal of our paper to find out what students consider as important characteristics that make a group project work in an online learning environment.

**Online Learning and Computer-Mediated Communication**

Distance learning in various forms has been around for a long time, but it was only until the past few years that it became feasible to offer online distance courses to large numbers of individuals. Statistics indicate that increasing numbers of adult learners choose online distance learning as a way to obtain new knowledge, to keep up with the changing world around them, or to continue their life-long learning (NCE, 2002). The open-ended learning environments provide an authentic, situated and self-directed learning experience with the electronic tools and resources (Hannafin, Hill and Land, 1997).

Based on their research findings, experienced online instructors and practitioners recommend that the main indicator of success in online teaching and learning is a well-designed course that fosters interactivity through the creation of a virtual learning community (Bender, 2003; Collison et al., 2000; Palloff & Pratt, 2001; Precece, 2000; Salmon, 2001; Swan, 2003). That is, the active communication, interaction, online presence, moderated discussions, and formation of an online learning community are the key elements for high quality online education. Problem-based learning (PBL) is one of the educational methodologies that have emerged from traditional classroom practice as a successful approach to strengthen learning. Therefore, designing distance learning experiences with PBL can be one of the alternatives by which institutions provide equal quality distance education to their populations.

In online distance learning environments, synchronous and asynchronous CMC and its technologies becomes the default means to mediate most interactions among students separated in space or time. However, the adoption of all communication technologies as “extension of man” (McLuhan, 1994) is a process that does not happen naturally. Boden & Molotch (1995) highlight the importance of co-presence in human interaction. Studies have also shown that people with different personalities and learning styles enjoy CMC and online learning at different levels and that facilitation, teaching presence, and students’ collaboration play important roles to make learning enjoyable and fruitful in an online environment (Lin & Cranton, 2004).

**The Study**
Context and Participants

This study was conducted in an online course called “Computer-mediated Communication” (CMC). The course lasted one semester and was conducted completely online using Blackboard. The course explored two major themes: (1) communication theories and (2) CMC technologies (e.g. email, discussion forums, blog, chat, multimedia presentation tools, web, games and simulations). The course assignments included class discussions, individual reflection journals, and a small-group PBL project. The goal of the course was to incorporate students’ learning of communication theories and CMC technologies in design of computer-mediated learning environments. The course was facilitated by one instructor and two teaching assistants.

Thirty-two students were enrolled in the course. Most were graduate students from a communication and instructional technology program. Some students already held jobs in the fields of education or educational technology. Twenty-six of the 32 students participated in the collaborative problem-based learning experience. The 26 students self-grouped themselves into four groups of four students each and two groups of five students each. The criterion for the voluntary self-selection into a group was common interest in the types of learning environments to be supported by CMC (e.g. teacher professional development and support, digital TV, virtual learning communities).

Student Perceptions of Online Group Work Experience at the Beginning

Students were asked to share some past group project experiences in a discussion forum at the beginning of the semester as a way to be prepared for the coming online PBL projects: to understand each other's interest and styles towards collaborative group work. Some open-ended questions were used as conversation starters: What did you like or dislike about a past group project experience? What do you think makes a group project meaningful for your learning? Twenty-three students posted their ideas for a period of 16 days. The discussion forum had a total of 38 postings including one from the course instructor and one from one of the course's teaching assistants.

We each analyzed the responses independently and then came together to exchange ideas about similarities and differences of our analyses. Using open coding and computer-mediated discourse analysis methods (Herring, 2004), we agreed on initial categories that students deemed important for a group project. Fifteen students provided an overall appraisal of their previous group work experience. Ten described it as “great” or “good”. Student statements regarding past group experiences focused on obstacles to group work or suggestions to achieve success. Focus, group dynamics, time management, leadership and facilitation, communication policy, commitment, formation of groups, dependencies, grading policy, flexibility, and work ethics were mentioned as important factors that helped make group work successful. A summary of students’
comments was made available to the students to help guide them throughout the group work experience.

The PBL Experience

Students were first encouraged to share their preferences and ideas regarding potential themes for group work during the second week of classes. Groups were more or less officially constituted by the fifth week. During this time interval, they also had the chance to begin exchanging ideas synchronously and consolidating groups by using chat tools. Once the groups were appropriately constituted, small group work focused on further defining the problem from the ill-defined alternative prompts that were provided. These prompts were:

- Design a new CMC tool or technology platform for educational purposes (e.g., a discussion board, virtual learning community, etc.).
- Create a conceptual CMC model for teaching and learning purposes.
- Design an online course for students in K12 or higher education environment.
- Propose a CMC implementation plan for a classroom, a school, a company, or an organization.

Students further defined the types of learning contexts for which they wanted to design CMC support. This included audience, technology access, computer literacy and communication needs. Conversations through synchronous tools such as instant messenger and the group’s private chat space on Blackboard and asynchronous e-mail exchanges were the mediation means that supported this process as reported by students. This process of problem definition and refining culminated with submission of a project proposal by each of the groups on the sixth week. The proposal had a dual purpose: one, it was intended as a milestone to get the students started early in the process in the thinking and development of their ideas; two, it was meant as an early instrument for the instructor and teaching assistants to know the direction of each project to provide immediate feedback that could help guide and focus the group work. One concern that was identified in most of the proposals was the need to reduce the scope of the projects based on time constraints enforced by length of the course.

After the groups received their feedback on the proposal, they began making decisions on the communication theories that would describe the communication settings of their target audience and those that would help justify the adoption of particular CMC technologies to satisfy those communication needs. The accessibility of the personal e-mail and the synchronous capabilities of the instant messenger tools helped facilitate this part of the process. Synchronous tools were used primarily to get together and brainstorm ideas for the project. Asynchronous tools were mainly used to exchange
results of individual work between synchronous meetings. The submission of a process report at the end of this stage (ninth week) represented another milestone in the PBL process. At this point, feedback focused on ensuring that the relevant communication theories were referenced and that the communication tools selected by students were appropriate to satisfy the communication needs that had been previously identified.

The final stage of group work entailed further refining the decisions made in earlier stages as well as incorporating new ideas from theories and tools that were deemed relevant at this point. E-mail was the tool that was ranked as first or second most useful tool for this stage of the process by most of the students. Students incorporated the feedback suggestions and finalized their projects for presentation to and feedback from the rest of their classmates by the twelfth week. The final three weeks of course work were dedicated to provide peer feedback about the projects as well as to reflect and assess the overall experience.

The process took approximately seven weeks to the completion of projects in addition to the three initial weeks during which students began exchanging ideas about potential projects during the group formation process.

**Students Perceptions of the Online Group Work Experience at the End**

At the end of the learning process, students commented on their experience participating in an online collaborative assignment. Overall, students used enthusiastic words to characterize it (e.g. enjoyable, successful, refreshing, rewarding, enlightening, exciting, positive, interesting, and unforgettable). Five students went further to describe this as a better online experience or the best they have had. Students commented on educational benefits of the process that were not shadowed by its online implementation. It allowed for an authentic opportunity to integrate communication theories into the design of communication. It provided support that relied on CMC tools for realistic environments in at least two of the groups (work environments of two of the students). The flexibility of selecting design projects in line with students’ interests for professional practice contributed to students perception of the experience as authentic (a learning experience that could be easily transferable to their future or current professional endeavors). Some students acknowledged the strength of the PBL process in establishing a visible link between theory and practice; a link that is not always evident in academic work. These features contributed to students’ perception of the learning experience as meaningful.

Students also spoke of the benefits of this learning process as an online experience. In spite of challenges in scheduling synchronous meetings, students pointed out the benefits of the flexibility of online meetings: there is no travel time associated with it, timing is more flexible as later hours can be chosen for work without worrying about late returns back home, and online meetings give the opportunity to work with people
that would not otherwise be accessible because of physical separation. Opportunity for review of synchronous conversations, tendency to engage in less small talk, and simultaneous access to multimodal sources of information during negotiation were mentioned as benefits of the distance education process.

As mentioned in the conceptual framework, PBL has been described as a constructivist educational implementation. The authenticity in learning that constructivist thinking attaches to education, together with recommendations to retain the complexities of the original context, place additional demands on students. Students sometimes referred to the process or some of its parts as overwhelming, challenging, frustrating and demanding. Nevertheless, they clearly recognized the benefits of participating in such an experience and acknowledged those as inherent characteristics of meaningful learning. The frustrating and overwhelming nature during the activities was mostly present during the beginning when there was more uncertainty about the overall process. A few students still expressed the wish to meet in person. This is consistent with theories about human communication mentioned above and also studied as part of the content of the class. The learning experience did begin for some with a degree of skepticism about the feasibility of conducting group work at a distance. Nevertheless, in all cases, students acknowledged having gained confidence in the process once it was under way.

Limitation of the media was one of the challenges most commonly mentioned by students. They quoted one of the course readings in justifying their claims in that CMC lacks the “thickness” of the personal exchanges (Boden & Molotch, 1995). Therefore, misunderstandings are more prone to occur, and insecurity about others’ true positions regarding ideas exposed are examples of difficulties students find when they cannot count on all the non-verbal communication cues that are present in non-technologically mediated interpersonal exchanges. The volatile nature of synchronous communication was also cited as challenging in this context. Many ideas can be simultaneously exposed making it difficult to follow a single idea, to keep track of all potentially promising ideas and to keep the focus to consistently make progress towards the desired goal. The fact that technology mediates communication adds a layer of access, literacy and readiness that can be transparent or can completely impede communication. Finally, different characteristics of different kinds of tools bear different effects on the communication and learning process depending on the time and purpose of their use.

In this particular experience, students resorted to e-mail (the most accessible communication technology) to share availability between group members to schedule synchronous online meetings. However, the limitations of the e-mail tool as a serial presentation of messages that does not layer or juxtapose similar information for comparison made it harder for students to negotiate things such as common available time slots for those meetings. Thus computer-mediated scheduling was the other challenge that was most commonly mentioned as a shortcoming of conducting online collaborative educational work. The CMC tools available to students from their personal assets and those that the university provides lacks tools to efficiently visualize group
member’s schedules in order to easily coordinate synchronous activities.

Finally, the continuous intervention of the instructor and teacher assistants in providing feedback and guidance throughout the process was the most commonly cited benefit. Upon submission of the project draft documents, feedback was promptly negotiated and provided by the instructor and teaching assistants. Three different perspectives joined to offer sound advice with regards to the direction of the project every time. One of the teaching assistants participated regularly in the synchronous conversations of the groups that requested her participation. This was deemed beneficial by members of different groups. Her participation helped clarify questions in a timely manner, guide students to make progress during chats, and reinforce them when needed to ensure they were on the right track. E-mail inquiries received prompt responses from the instructor and assistants, who were also instrumental in facilitating discussion board conversations to help students understand course content and explore their relevance for group work.

Discussion, Recommendations, and Educational Implications

As stated above, it is necessary to implement meaningful learning experiences in the research and practice efforts to promote quality online education. CMC presents opportunities as well as constraints in collaborative problem-based learning environments. Student perspectives are useful in informing whether different kinds of guidance or facilitation, tools, rules or approaches need to be implemented to ensure the benefit of this methodology for distance learners.

The students’ opinions regarding these particular learning experiences suggested some recommendations for future designs of these types of collaborative learning environments in the context of problem-based learning. Consistent with PBL design theory, authentic problems must be aligned with the kinds of professional activities students would perform if engaged in subject domains as practitioners. Providing these kinds of problems and allowing students to further customize them to better match their interests is a design decision that helps to get the process started with the right foot. These findings are consistent with adult learning theory that suggests that adult learners are more interested in immediate knowledge applications. Moreover, allowing students to group themselves according to common interests facilitates a sense of ownership and thus enhances motivation and investment in the learning activities. This echoes what literature emphasizes as an effective method to encourage meaningful learning in face-to-face settings.

Students relied heavily on synchronous communication to make decisions in their group work. For instance, scheduling was indicated as difficult through computer-mediated communication. One way to address this need is to explore accessible calendar tools that will share schedules.
It is important to ensure access and competence in the use of communication tools. Guidelines for use can be provided to students before they start collaborative work. Features such as recording of synchronous exchanges and use of collaborative tools need to be understood before they take place. Students and instructors must know the purpose of each tool as well as its strengths and limitations. This can help to avoid possible frustrations associated with the selection of an inappropriate tool to support a given task.

One last recommendation has to do with the design of instructor support during the experience. Instructors need to take into account the characteristics of the learning experiences, especially when they are of a constructivist nature, in order to provide support that will allow students to benefit the most from a self-directed learning experience and avoid the frustration of not receiving help when needed. Instructors need to be sensitive of the kinds of support needed by students and its timing so that they provide it when the content or activities in which they are engaged demand it.

**Conclusion**

As a result of this learning process, it was verified that online collaborative work for educational purposes can happen and result in a positive educational experience for students who would otherwise be isolated by temporal or physical separation. However, in order to ensure its success, educators need to carefully design learning activities so that benefits are maximized and anticipated shortcomings are overcome. Educators need to consider beforehand the combination of factors that stem from the subject matter, technology-mediation tools, and the nature of the activities in which students participate. This way, online learners will be able to benefit from educational methodologies that have been recommended as effective in the practice of face-to-face implementations with the added benefits of the technology mediation and informed prevention of potential limitations.

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