

# Managing International Student Collaborations

## An Experience Report

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**Abstract—** Knowledge and experience from working in international collaborative projects prepares engineering students for their future careers in a global market. Hence this is an important element in higher education, although seldom provided in the curriculum. One reason for this lack might be uncertainty in how to manage international collaborations and to create a good learning environment for the development of skills related to international collaborations. Therefore this article describes our experiences from managing international student collaborations including theoretical underpinning for our choices when relevant. Having given the context of, and the strategies for running our two collaborations, we provide an analysis of our experiences. This includes observations of differences in the two collaborations, both when due to use of different strategies and when due to different contexts, as well as observations of similarities. With this in mind, we present recommendations for running international student collaborations.

**Keywords—** component; International student collaboration, open ended group project, experience report

### I. INTRODUCTION

Our experiences stem from two international student collaborations in projects with real clients based on the Open-Ended Group Project (OEGP) concept [1, 2]. One collaboration is between an American site and a Turkish site (US-TUR) and the other between the same American site and a Swedish site (US-SWE). The former has run twice and the later seven times. Both collaborations include real clients and open-ended problems but the courses have different syllabuses and the collaboration between the universities is based on informal grounds. While neither international student collaborations nor the OEGP concept are new ideas, they are in the authors' opinions underused in learning environments.

Running international collaborations typically means having to deal with differences between the educational settings, e.g. learning objectives, course durations, contexts in curriculum, and grading schemes. Other general issues are cultural differences, having different holidays, few if any face-to-face meetings, and being in different time zones. In our collaborations we also have to deal with having clients local to one site, which means having language issues and students having different access to the client, and how to handle that some students are being graded by faculty from another site. Other educational issues include how to motivate students, how to provide scaffolding, how to use collaborative technology, and having a learning process focus or end-product focus for the project.

The aim of the paper is to inspire others interested in running international student collaborations by sharing our experiences from working with international student collaborative projects from a management perspective and to relate our choices in creating learning environments to relevant engineering education research.

### II. CONTEXT

#### A. Bilkent University (BU), Ankara, Turkey

The University is the first private non-profit university in Turkey and was founded in 1984. With its approximately 12.000 students, the university is well known as a pioneer research oriented Turkish university. Starting from spring 2009, the collaborative International Term Project course has been held during the spring semester that runs from early February to the end of May, and has generally between 5 and 10 students per semester. This is a required course in a computer science education focused program in the Faculty of Education. The course aims to allow students to collaborate with peers from different cultures as part of an international team and work with a client to assess their needs and requirements to develop a technological solution. Students gain experience with interpersonal communication and conflict resolution within teams [3].

#### B. Uppsala University (UU), Uppsala, Sweden

The university has approximately 40.000 students and is hence one of the largest universities in the country. The IT in Society course is given in the fall semester of the IT engineering program. It runs for the whole semester, i.e. beginning of September to Christmas. It is a 15 credit course, i.e. representing half of the 30 credit study load for a semester. The course is elective and the number of students has varied between 10 and 25 during the years we have had an international collaboration, i.e. since 2005. The course has been presented elsewhere; see for example [2, 4 - 7]. The learning objectives for the course are in short to provide students with substantial knowledge and ability concerning the interplay between technology, users and organizations based on relevant areas in human-computer-interaction, psychology and system construction, as well as experiences in real systems developing projects.

#### C. Rose-Hulman Institute of Technology (RHIT), Terre Haute, IN, U.S.A.

A private engineering school in the United States, it was founded in 1874. The Computer Science and Software Engineering department offers undergraduate programs in

Computer Science and in Software Engineering. The Computing in a Global Society course is an elective for both majors. Learning outcomes of the course include being able to explain the importance and relevance of globalization, in particular as it relates to computer science and software engineering. Other goals are to be able to communicate effectively with teams from other countries and cultures and to demonstrate effective work with these teams to complete a project.

#### *D. Collaboration between Swedish and US Students*

The collaboration started in 2005, and has evolved using an action research framework since then. This includes a constant iteration of plan, act and evaluate which has resulted in many improvements of the course as well as some changes not contributing to improvement.

The client of the student project is the county council in charge of health care in the Uppsala region of Sweden. They have provided the student projects with different open-ended and complex problems relevant for the use of IT in the healthcare sector. Some examples of problems have been to help the county council to prevent and recognize data intrusion problems related to the use of a common patient record. The majority of students had their major in computer science or IT, but some students had other majors such as mechanical engineering. Most students had studied for three or four years at the university.

#### *E. Collaboration between Turkish and US Students*

This collaboration started in spring 2009, and is currently in its 3<sup>rd</sup> offering. For each of the collaborations, student teams complete a software project for a non-profit international organization located in Turkey. The International Children's Centre has been a client for all collaborations, and UNICEF (Turkish National Committee) for one of the collaborations.

Students from the US visit Turkey twice during the semester, once at the beginning of the project and once at the end. Students meet with the client at least once during each visit, at the beginning to analyze the problem and present their proposal, and at the end of the project to present their completed project to the client.

Although the courses are not identical to each other, the client proposal and the software design and development process form the basis of the student collaboration. During the semester, students are monitored through weekly meetings and other activities, such as progress reports.

### **III. INTERNATIONAL COLLABORATION CONSIDERATIONS**

This section describes identified management issues regarding the collaboration including relevant theoretical underpinnings.

#### *A. Educational Setting Differences*

Running international collaborations typically means a few challenges when it comes to dealing with the differences in educational setting. The collaboration could be set in a joint course, but institutions typically want to have their courses

defined according to their own standard. Different courses mean having to overcome differences in learning objectives. This doesn't mean that it is an objective to have the courses as similar as possible, but rather that the collaborators need to be aware of the differences and have strategies for dealing with them. The challenge is to turn the differences into advantages, or at least into something that does not jeopardize the collaboration.

Other differences to manage might be different course durations, contexts in their curriculum, and grading schemes. The difference in course duration could be that one cohort continues with their course after the other has finished, which in the US-SWE collaboration is solved by the American students enrolling agree to work to finish the project after their study period has ended. A similar issue with the course duration in the US-TUR collaboration was solved by redesigning the course. That the contexts for students in the collaboration are different can either be an issue for each student to cope with, or for the faculty to try to smooth out.

#### *B. Cultural Issues and Communication*

Cultural differences affect the project in many ways including the communication and work styles of the participants. Culture impacts people's interpretation situations and how they react to them [8]. Language differences are part of this; they are experienced to different degrees within each of the collaborations. The communication language for all projects was English. While all participants in the collaborations are proficient in English to varying degrees, some students find it difficult to communicate remotely in their non-native language. Non-verbal cues may be missed, and often lead to frustration and misunderstandings. One method to address this in the US-SWE collaboration was the introduction of an external expert in intercultural collaboration and communication starting in 2007. In the US-TUR collaboration, the same expert was part of the collaboration in 2011 and other speakers with experience in both cultures have also been invited. The work with intercultural competence has been elaborated in other publications; see for example [9, 10].

In the US-TUR collaboration, although there were cultural differences, more important were the observed interdisciplinary cultural differences within the team. The Turkish students have an IT focus with a view of instructional processes and have a tendency to focus on user and learning needs. In contrast, the US students being computer science majors have a more technical focus and expectation. The Turkish students often felt that there was not enough discussion of the interface and the design components, where the US students often felt that the time would be better spent starting the implementation and working on the interface design details at a later point in the project. Although students felt the impact of these differences, they were rarely, if ever, discussed among them. The issue was addressed in part by coaching the team members, and encouraging them to recognize the different strengths and act as leaders in their specialty areas.

Issues such as different semester schedules, break weeks and holidays are important considerations in the management of the project. Time changes, holidays, and school breaks, if

they are unexpected, might lead to missed deadlines and considerable frustration within the teams. One strategy used was the preparation of a common schedule that could be accessed by the students and instructors throughout the project. The schedule included holidays, break weeks and the different dates for daylight saving switches. This allows students (and instructors) to be aware of and plan in advance for any downtime in the project.

When working in globally distributed projects, the difference in time zones makes collaborating in real time difficult and increases the response time in getting feedback from teammates [11]. As described by Holmstrom et al. [12], 'despite flexible work hours and communication technologies that enable asynchronous communication, extensive delay in responses brings with it a feeling of "being behind" and "missing out" – even losing track of the overall work process'. In most local projects, students are able to access their teammates whenever necessary to ask a question or to get immediate feedback on any issue that comes up. With global projects, students do not have this immediateness of communication and the different time zones often create difficulties for the team as they require the students to plan and prepare in advance. One strategy is to provide guidelines to the students about email/communication etiquette such as the time frame for replying to messages, the importance of replying to messages, etc. Another way the issue was addressed was to establish regular (in this case, weekly) full team meetings. This has drawbacks as well because students often wait for these meetings to get the necessary feedback instead of arranging informal sub team meetings or sending messages as needed, leading to delays.

According to Smith and Blanck [13], 'an effective team depends on open, effective communication, which in turn depends on trust among members'. They suggest that if a team can get together for face-to-face interaction, they should do it at the beginning of the project where trust can be established while planning the project. During the collaborations the US students are required to visit the partner university at least once in the project. During the visit weeks students are encouraged to spend as much time together as possible to encourage team building. Especially at the beginning of the project the face-to-face meetings are very important and they help students to establish a social interaction, and makes communication throughout the project more efficient. In cases where all students have not visited the partner institution at the outset, it has been observed that there is little social interaction, and students have a difficult time initiating communication and bonding as a team [2, 5].

### C. Client Selection

After examining many current instructional models, Merrill [14] underlines that the most effective learning products or environments are those that are problem-centered. Having an external client is one way to add work related aspects [5] to the collaboration. This will, in most cases, mean that the client is local to one of the collaborating sites. One issue with such a setting could be around language, since it might be that much information is only available in a language not master by the non-local site(s). This has been the case in the past and has

been addressed by the local students providing English summaries of all relevant information.

Another issue to have strategies for is the uneven access to the client. The local students can have face-to-face meetings with the client and other personnel in the client's organization. There need to be ways to share information obtained locally, which is the same issue irrespective of the location of the client and the organization even though it is more difficult to solve. The potential for a sense of unfairness is however a unique issue to deal with that is due to the locality. There is a definite danger that the motivational reason to include the client might turn into a de-motivational factor for the non-local students. It is thus important to provide opportunities for the non-local students to feel that they can contribute with something extra that is due to them being from another place. This could, for example, be to add internationalization aspects to the project. Having the client from another city or from a third country may help to decrease the possibility for de-motivation, however this decision would increase the complexity of the settings. An ideal client may be an international organization that has units in the cities of the collaborating universities.

One issue raised by interaction with real clients is that they have other obligations and consequently it can be difficult to get reasonable access to them. This particular aspect has been mitigated in the US-SWE case by use of a single, reliable client and requiring all students to work on different aspects of a single project.

A further potential issue with a real client is that some students may feel ethically unable to help certain clients, e.g. for political, religious, or competition reasons. Because of this, we have chosen to work with the public health sector, in the US-SWE collaboration. Similar considerations in the US-TUR collaboration lead to selection of an international non-profit organization with a focus on children's rights as client.

### D. Student Assessment

There are different possibilities for how to grade the students, but it is likely that faculty from a remote site will have a say in how a student is graded.

A related issue is that students might have different grading schemes. This might cause disharmony between the student cohorts. As in the US-SWE collaboration, where the Swedish students were graded on a pass/fail scale, but the American students had a much finer grading scheme. There was a rubric for how credit was earned and how it resulted in grades on the American site. The issue that almost broke the collaboration was that much of the credit was earned based on how well a group did and that the American students feared that the Swedish students would not be motivated to contribute once they had passed the pass level (as the American students saw it). This was not seen as an issue on the Swedish side, since they would not pass the course if they didn't contribute throughout the whole collaboration. A surprise exercise at the end of the project, where the students were asked to pay each team member according to how they had contributed in the project, saved the collaboration. This was because even the American students paid the Swedish students better than they paid their fellow Americans. See [15] for more details. Similar

issues were experienced in the US-TUR collaboration, which underlines the importance of making the assessment criteria clear at the outset, for all participants in the project.

#### E. Student Motivation

To improve motivation, Morales [16] believes that learners' free-flowing expression and sharing ideas are encouraged in learning environments and creation of these environments is facilitated with constructivist instructional design. Principles for constructivist instructional design referred to here are described by Honebein [17] as seven items: (1) provide experience with the knowledge construction process, (2) provide experience in and appreciation for multiple perspectives, (3) embed learning in realistic and relevant contexts, (4) encourage ownership and voice in the learning process, (5) embed learning in social experience, (6) encourage the use of multiple modes of representation, (7) encourage self-awareness in the knowledge construction process. These seven principles can be observed in many aspects of the course designs and activities in both collaborations. For example, embedding learning in realistic and relevant contexts principle is supported by having real clients and projects, ownership and voice is encouraged by students' own determination of the topic/scope of the project, or encouraging self-awareness is supported by reflection assignments and meetings. It is also supported indirectly through explicitly discussing the Open-Ended Group Project pedagogy [1, 2] underpinning the courses, which aids in taking ownership of the learning process.

The underlying pedagogical approach is based on the concept of the Open-Ended Group Project (OEGP) that is designed to address the type of activities where a central concern is to balance the complexity of the problem with the multiplicity of possible approaches to its solution. An important aspect of the educational setting is that the project is placed in a real environment with a real client. This provides an authentic level of complexity and also is shown to increase student motivation [18].

#### F. Project Scaffolding

For a satisfying learning experience in open-ended global collaborative project cases, students are expected to acquire and use various capabilities. Considering the complexity and variety of competencies required, instructional scaffolding was chosen as one of the primary strategies. Scaffolding is defined as "a variety of methods that include a sequence that gradually reduces and removes supports of various kinds (fading) and a sequence that gradually increases the acceptable standards of performance (shaping)" [19]. Simons and Klein [20] refer to scaffolding as a valuable instructional tool to enhance student performance and they emphasize its important role in problem based learning (PBL).

From a scaffolding perspective, in both collaborations, the semester was divided into phases and some milestones were enforced. Early assignments, lectures and guest speakers were also organized during the initial phases of the course. As Greening [21] points out, PBL involves a slower startup which may be due to the development of important "hidden" skills, and that at this stage of the PBL, ensuring the existence of

adequate scaffolding is critical. Throughout the semester, including the initial phases, regular reflection assignments or meetings were used to highlight students' own responsibilities and to improve the process for the following phases.

The use of scaffolding mechanisms may differ due to various settings such as students' schedules, class sizes, and resources such as the number of mentors. Such differences in scaffolding may include the pace of weekly progress meetings, the amount of resources from the previous experiences or use of structured templates. One example of scaffolding was the use of mentors. Subgroups had a faculty assigned as mentor and project leaders had an external mentor, which differ according to number of mentors and class size. Another example from the US-TUR collaboration was the use of recommended templates for the initial phases of software development. In such cases, scaffolding using templates helps a lot in order to save time for the implementation phase.

To enhance the learning, it is important to keep in mind to reduce the level of scaffolding during the process was important. For example, while making interviews with the clients, depending on readiness of the students, the mentors may prefer attending to the first or second interviews but it is also important to let students continue interviews independently later on.

#### G. Collaborative Technologies

Collaboration and communication tools are critical components of such global intercultural project courses [22]. Most of the communication and collaborative work is handled through technologies. General uses of technology in both collaborations (US-SWE and US-TUR) can be categorized into five groups: 1. The use of a course management system as the official platform of the course and the collaborative project (e.g. Moodle, TeamLabs), 2. Synchronous communication tools (e.g. Chat, Video conference room, Skype, Google+ Hangout) 3. Asynchronous communication tools (e.g. Moodle Forums, Facebook, e-mail) 4. Document sharing (e.g. SVN, dropbox) 5. Collaborative writing (e.g. Moodle wiki, Google docs, Trello).

As a course web page or virtual classes created on institutional course management systems (like Moodle), an official platform is provided to the students. Instructors' weekly meetings are organized and handled by using video conference rooms or tools like Skype. In addition to these, students generally decided the appropriate technology for their communication and collaboration during the first face to face meeting week. Although the official platforms and tools provide many opportunities for communication and collaboration, it is observed that students may prefer alternative tools various reasons such as: a) to have an opportunity for informal communication (since instructors are not there), b) student habits and their regular use of popular tools like Facebook, MSN Messenger, c) the tool has a user friendly interface and fun components in it, and d) the tool has specific features appropriate for the tasks (not available or not easy to use in the course management system).

From a management point of view it is critical to consider the needs and motivations behind the selection of technology.

In addition, it is also important to have a set of technologies, which can be offered at different phases of the project. For example, technology to support the generation of ideas and to build consensus may be more critical at the beginning of the project but technology to support individual work, workflow management and document sharing may come later [23].

#### *H. End-product and Learning Process*

Deciding on the type and scope of the end-product is critical. With a strong motivation to satisfy the client, there is a potential to focus more on the end-product than on the learning process. This is known as the process vs. product dilemma.

The types of outputs for the collaborations has an impact on the decision making process of the teams. In the US-SWE collaboration, the final product is a report and presentation, whereas the output of the US-TUR collaboration is a software system with user guides and a presentation. This difference can be critical because of the time and resource limitations. For example in the case of the report, students can be more free and objective when exploring and recommending solutions to the client, but in the case of developing a software they naturally limit their solutions, consider their skills-sets and knowledge in order to develop the software product before the end of the semester.

In both collaborations, while there is a strong focus on the learning process and development of competencies, the end-products are also used to grade and motivate students and to fulfill the clients' expectations. The challenge will be to maintain a balance throughout the semester.

#### **IV. DISCUSSIONS AND RECOMMENDATIONS**

From a management perspective, similarities and differences between the collaborations can provide a base to discuss various issues and may help to understand the dynamics behind the global collaborative project courses.

The two collaborations shared many similarities. In both, the client was the same for multiple semesters. This simplifies the collaboration as both the client and the faculty know their roles and expectations. With one exception, all collaborations had one project (that may or may not be divided into subprojects) and one client. For each project, the students from the US visit the partner site twice, in the beginning and towards the end of the project. In addition, they are run as separate courses, where each site maintains their own course syllabus; however the focus of the collaborations is the same. Both collaborations take a constructivist view and use the Open-Ended Group Project approach. Scaffolding is used when appropriate, and depending on the project attributes (size, product, number of students, etc.).

The effects of major differences between the two collaborations appear in the course design, during the implementation period and through the outcomes. In the US-SWE collaboration students from both sites are engineering students, however in the US-TUR collaboration, the Turkish students have computer science education focus at the faculty of education. This brings out interdisciplinary issues in addition to intercultural issues. Although the emphasis on process and

product is similar in terms of the course implementation, they are different from client's point of view. While a presentation and a report are targeted in US-SWE collaboration, a software product is targeted in US-TUR collaboration. In US-SWE collaboration the team size is typically 20 or more which results in a higher number of subgroups and their mentors, however in US-TUR collaboration, team size is 12 or less with no external mentors guiding the students.

The complexity of global collaborative project courses both for students and teachers may change a lot depending on some initial critical decisions. As an example decisions about "offering a joint course or not" or "having one project topic from one client for the whole team or having a few different projects from different clients" may affect many aspects of the course and implementation period. Another critical issue, which is directly related to many other issues like motivation, topic or client selection, is building trust and understanding among faculty, students and client. In addition to these, better planning for the visit weeks and/or the initial phases and having mechanisms to build consensus around expectations is worth seriously considering because of huge impact they may have.

There are a number of important considerations when planning for a successful collaboration. Details such as holidays, breaks, time differences, scheduled meeting times for the visit week preparation can have an impact on the success of the project. It is important that collaborators pay attention to the details, however to what degree the faculty or students are responsible for the details leads back to the discussion of whether to manage or not manage. As discussed, care must be taken to choose a project and client that is engaging for all cohorts. The client plays a key role; therefore care should be taken when selecting the client. Once selected, collaborators should have a clear idea of what is expected of the client, and the client should be informed of these expectations. Finally, while students will establish various tools for informal communication, it is important to establish a formal communication channel for faculty, students and in some cases, clients. Because the cohorts may have different preferences when it comes to collaboration tools, it may take time and effort to encourage effective communication. It may be useful to allow the student group to select the formal communication tool; however it may be difficult to achieve consensus.

Setting the level of scaffolding depends on the complexity of the educational settings and the project expected by the client. Especially when the complexity of the project is high and when there is a gap between the students' profiles and the requirements of the client, more scaffolding would be needed. To increase the learning experience satisfaction in terms of intercultural issues, project life-cycle management issues or documentary issues can be supported through working in phases or using well defined templates. If these issues and relevant competencies are considered to be the part of the course goal, deciding what to manage or support would be critical. Sharing previous years' experience and expertise of external speakers are always suggested.

Because of the challenges that communication and cultural issues bring to the collaboration, it is important that there is an

agreement on the expectations of the course between and among all participants (faculty, students and clients). This helps to establish trust and understanding from the beginning of the project.

Establishing early informal communication among the students is difficult but it is important to the success of the project and the satisfaction of the participants. When developing a collaboration, an important consideration is how to establish informal communication, and how large of a role faculty should play in this. The best way to establish this communication early is with face-to-face meetings at the beginning of the project. This meeting establishes trust and understanding among the faculty and students and helps when communication is remote and the project becomes complex.

To manage or not to manage represents a common dilemma in global collaborative project courses. For a satisfying outcome and to fulfill the expectations of the client, students are expected to perform well in various areas. The expectation of a high number of competencies, limited resources, and the challenge of a real life project forces stakeholders to manage and guide the teams efficiently. However, for a satisfying learning experience, it is meaningful to have more tolerance for failure and to encourage students' learning through experience or through interaction with other cultures. This approach enforces stakeholders to focus on learning experience and manage the production process loosely, which may easily result in decreasing quality of the end-product prepared for the client. Managers should also consider that even faculty who are teaching these courses for many years improve similar expected competencies through experience. When considering undertaking similar courses, as teachers or managers deciding whether to manage or not to manage such courses, what to manage and what not to manage, or what level of management to apply are initial questions that should be answered.

## V. CONCLUSION

International collaborations are challenging for both students and faculty alike. However it is a rewarding experience that improves with each offering.

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