

# In Their Words: Student Feedback on an International Project Collaboration

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## ABSTRACT

In this paper, we describe a collaborative course experience between students from universities in the USA and Turkey. Student teams worked together on a software engineering project for a non-profit organization based in Turkey. The students learned valuable skills in team-work, collaboration-facilitating software tools and working with peers from a different culture and a different time-zone. At the end of the course, in a focus group, students were asked for feedback regarding the course and its outcomes. In this paper, we describe the course from the student perspective. From this, and the instructor's experiences we provide a list of guidelines.

## Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education – *Computer science education, Curriculum.*

**General Terms:** Experimentation

## Keywords

International collaboration, software engineering, teamwork

## 1. INTRODUCTION

Software Engineering is a field where international collaborations are now the norm. Software teams can be spread around the world and work across time-zones and language barriers. Students entering the current workforce need to be comfortable with the challenges that arise in these situations.

In [5], different mechanisms to provide an international dimension to the Computer Science curriculum internships, study abroad programs, short courses abroad, and student and faculty exchanges. One idea that is described is a collaborative project between student teams that are situated in different countries. This provides students with an opportunity to experience the challenges and benefits of international collaborations.

In 2009, a collaborative project course was offered by Rose-Hulman Institute of Technology (RHIT) in the United States and

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Bilkent University (BU) in Turkey. In this work, we will describe the collaboration between the two departments, and the feedback received from the students regarding the challenges and successes of the course. Using this feedback, and the instructors' experience, we will provide guidelines for similar projects.

Reviewing reports on similar collaborations, we see that authors have looked at various aspects of such collaborations. In [4], the authors study the role of collaborative technologies and culture how it affects students' perceptions of their collaborations. In [8], the authors describe the Global Studio Project. The authors describe how learning to improvise in a rapidly changing real-world project is an important skill that students need to learn and that collaborative projects with real clients can provide a learning opportunity. In [6], the authors describe the creation and progress of a collaborative project course between student team from RHIT and Uppsala University in Sweden. The course that we describe in this paper is an offering of the course described in the paper, where the collaboration is now between RHIT and BU. In this paper, we describe the collaborative course and the experience from the student perspective. We used feedback obtained from the students through focus groups and several informal conversations with the students.

In section 2, we will describe how the course was organized. In section 3, we will talk about the challenges faced by the students and how these were handled by the students and instructors. In conclusion, we will provide our guidelines.

## 2. THE COLLABORATION

### 2.1 The schools

BU is a private nonprofit university in Turkey. The Department of Computer and Instructional Technology Teacher Education (CTE) is an undergraduate program which provides students with a strong computer science and technology background from an educational perspective. Students graduate as qualified teachers.

RHIT is a private engineering school in the United States. The Computer Science and Software Engineering department offers undergraduate programs in Computer Science and Software Engineering.

### 2.2 The course

RHIT's Computing in a Global Society course which is an elective for Computer Science and Software Engineering majors has the following outcomes:

1. Explain the importance and relevance of globalization, in particular as it relates to computer science and software engineering.
2. Effectively communicate with teams from other countries and cultures.
3. Effectively work with teams from other countries and cultures to complete a project.

In order to meet outcomes 2 and 3 effectively, students would collaborate with students at BU.

As part of the CTE curriculum at BU, students complete a required project development course. During the spring 2009 semester students were given the option of opting for this new collaborative course.

Since the CTE course had to satisfy the outcomes

1. To understand and apply modern principles of software requirements analysis and software design to develop a software project with a fixed deadline.
2. To work as a part of a team to develop a software project by applying strong interpersonal communication, and problem resolution skills.

it was decided by the instructors that the collaborative course would closely mirror the original CTE course. In total, there were eleven students registered to the course, three from RHIT and 8 from Bilkent. BU's spring term begins about three weeks before RHIT's and therefore the BU students began work on the project at least three weeks before the RHIT students.

### 2.3 The client

The client was the International Children's Centre (ICC) Child Right's Programme. It is a non profit, non-governmental organization based in Ankara, Turkey. It has activities and projects that focus on child and youth advocacy and awareness. Two ICC employees served as liaisons between the students and the ICC itself. Since the ICC was based in Ankara, BU students had more direct contact with the ICC contacts. It was clear that the project would be centered on children's rights to serve the purpose of the organization, but that was the most the client was sure of. Because of the youth centered focus of the organization, the client was eager to have as much input and direction from the students as possible. Therefore, the first challenge for the students was to determine what the needs of the ICC were and how the students could help with these needs.

### 2.4 Collaborative tools

Since a large portion of the work done by the students is intended to be done when they are in their respective schools, online collaborative tools play a key role in facilitating group work. Many tools have been advocated by other teams that have dealt with a similar course such as a combined e-mail lists and Microsoft NetMeeting in [7], websites and Skype in [3], and Wikis in [9].

Our students used a range of collaborative tools. For weekly meetings, Skype was used for videoconferencing. For other communication they used: Moodle CMS page and forums, and an e-mail list with all the students and instructors. SVN repositories were created for the student teams to maintain and share documentation and code for the project. Students were required to submit all their deliverables in designated folders in the SVN repositories. Students also used Google Docs before they had

access to the SVN repositories. In [1], students describe their experiences with various collaborative tools.

## 3. COURSE ORGANIZATION: CHALLENGES AND SOLUTIONS

The project and hence the course was divided into three stages. The three stages were Planning and Analysis, Design, and Implementation. Prior to the Planning and Analysis stage, the BU students also conducted a preliminary investigation.

### 4.1 Preliminary Investigative Stage

Because the BU students' semester began earlier than their international colleagues, during the first three weeks of their course they completed a preliminary investigation. Students from BU met with the client and the client educated them on the UNICEF convention on the rights of the child, and some of the work that is being done to spread awareness. Students used this opportunity to formulate possible projects for the client. Information from these meetings and workshops were communicated to all team members using the online course environment. Prior to the arrival of the RHIT students an introductory meeting was organized via Skype where all students and instructors had a chance to meet and discuss what they had learned, potential projects and visit related details.

### 4.2 Planning and Analysis

At this stage, RHIT students joined the project. The students visited BU and the entire team was able to interact directly with each other. This was an important first step for the students. They met their peers and got to understand each other's technical backgrounds and to some extent their cultural backgrounds. The RHIT students learned from the BU students what information had been gathered in the initial phase with the client. During the analysis week, students worked together to determine the problem statement. From this, two projects were selected. The first project involved building an interactive web site, in both Turkish and English, designed to teach children about their rights. The web site would be designed with a child-friendly interface, and was to include interactive games, videos, and stories from children around the world. The second project was designed for use by ICC staff to provide a tool for collecting and browsing news items centered around children's rights. The implementation was a Google-supported map where staff could add and browse interesting news items. Students then divided into three teams – one to design and implement the web site, a second to design and implement educational web games, and the third to design and implement the Google-based mapping tool. At the end of the visit, students presented their proposal to the client, instructors and other students. Following the visit, each team had to submit an analysis report.

#### 4.3.1 Challenges faced during Analysis Phase

There were two major complaints from students at this stage. RHIT students were frustrated by the apparent lack of a clearly defined project and did not understand decisions that had been made before they arrived.

According to a student:

*"One of the problems early on was that the client did not have firm idea about what they wanted and there was no set problem were went to solve. It was us giving a solution to a problem that we were guessing they had."*

To address this challenge, a student recommended:  
*"Having a set problem, [it was frustrating to] go to the client and figure out what their problem was. This [project] was us trying to figure out problems and solutions."*

BU students, on the other hand, had spent considerable time working with the client. The students did attempt to communicate the information from the client via the online course environment, however because the RHIT students were at the end of their previous term, they were not able to be as involved in the project as the BU students who were just starting a new term. Based on discussions with the client the BU students then decided on a project they felt was most interesting to them. They were frustrated when the project changed during the visit week.

Again, the responses received from the students:  
*"[RHIT students] started the project after 3 weeks, after we started, we planned, we analyzed and then they changed our analysis plan."*

*"There was a lot of interfacing with a client, that [RHIT students] probably never got the full feedback on because we were out of the loop as far as communication goes."*

Also,  
*"It would be nice if the schedules matched better. They had 3 weeks of classes before our semester started, so they worked for 3 weeks and then they had to explain what has been happening for the past 3 weeks, then when we started everything changed."*

However, during the visit week, students felt that the face-to-face interactions were helpful in improving communication, and building personal bonds which made them feel more like members of a team.

According to a student:  
*"What would take hours/days to do emailing, [during the visit] we get done very quickly. Also it helps to create personal bonds between the team members, a better feel and better interactions with team as a whole."*

### 4.3 Design Phase

In this phase, students worked from their respective campus locations. They were required to attend a weekly meeting where the students used Skype to communicate. The meetings provided students with an opportunity to interact with all the teams and get feedback from both instructors. Although it was not a formal requirement, generally students established weekly meeting times where they could meet with their sub-team members. Students had to submit a design report at the end of this phase.

#### 4.3.1 Challenges faced during the Design Phase

This was perhaps the most challenging phase for the students, since they had no direct interactions with each other. It required them to plan carefully and co-ordinate well. This is perhaps where most of the learning took place for the students in terms of learning to interact with peers from a different location. Students found remote communication difficult due to busy schedules, time differences, and the resulting delay in feedback. First, there were the logistical challenges, such as arranging common meetings, and establishing regular communication:

*"Because of the time difference we sometimes missed a meeting. [Remote communication] wasn't really effective."*

*"[in other project] a lot of times the meetings are less formal, but this needs more formality because you have to organize across time zones, reserve rooms get on the web cam."*

*"there is a time difference, it is hard to find [international teammates]. If I took a domestic term project, I can reach my friends anytime I want because they are close to me."*

*"Normally I know if [a teammate] reads my email because I can ask to check it but here we just communicate by email or by Skype once a week, I think it is hard"*

*"we have a class on [the meeting day] in the morning and then we have to wait all day for the Skype meeting."*

As well, the differences in the courses (outcomes, required vs. elective) at both institutions lead some student to believe that not all students were fully invested in the course, and that the project related deliverables (and resulting grades) were more important to some students than to others.

*"There were problems because of different aims of course. The course is important for CTE students, their course is a globalization course. Sometimes they do not care about the project. They should be the same."*

Contributing to this problem was that students had many commitments outside the course, so much of the work was left until the last minute.

*"We were very busy this semester; had many projects... It was hard for me because I had very little time. The design part was very long, implementation was too short. I think it was a problem. The structure of the project should be revised."*

This meant that they may not have communicated as regularly during the weeks leading up to the deadline as they needed, and as a result there was not enough time to work together to complete the deliverable, due to conflicting schedules and time differences

While they definitely faced many challenges during the design phase, they managed to produce detailed design documents for each of the three modules. In doing so, they were able to leverage their varied backgrounds quite effectively. For example, the web site group at BU interacted with a graphic designer from outside BU to determine the aesthetics of the web site. Students from RHIT were able to use their experience with open-source software to understand and apply Google's API for the mapping tool.

### 4.4 Implementation Phase

This phase had two milestones. The first milestone required students to produce a prototype for the client. The client would then provide some feedback. Students would then complete the second phase, which was the finalized implementation and user manuals. The second phase included the final visit by the RHIT students to BU which coincided with the end of the project. At the end of the visit, students had to present their work to the client, BU faculty and students and their instructors.

This final phase concluded a week after the last exams for both sets of students, as this was the only time a visit could be coordinated.

#### 4.4.1 Challenges faced during the Implementation Phase

While there were a couple of issues with students having to delay the start of their internships, most issues were quickly resolved. In

spite of the long flights and having to work immediately after their final exams, both student teams relished the opportunity to work with each other face-to-face and finish the implementation. As in the initial visit, students felt that the final visit was important to the project as any problems in communication experienced during the semester were quickly overcome with in person interaction.

Some comments about the final visit week:

*"[the visit] was the best part of the project. We all came together and had a chance to work on the project all together. Because our colleagues were far away, it was hard to come together to finish something."*

*"Technology is really cool these days as far as global computing but it's still hard to beat face to face interaction."*

The client's response to the final project deliverables and the presentation was that the students' work had far exceeded his expectations.

#### 4. General Observations and Analysis

We used two focus groups to obtain students feedback – one for the BU students and one for the RHIT students. The mediators and recorders were people unconnected to the course and were provided with a set of questions by us. Topics other than those on the provided list were also discussed.

During the focus groups, students were also asked to provide some general observations regarding the course and its outcomes. Based on the responses we obtained from the focus groups and other informal feedback, we make the following observations:

**Students would like reciprocal visits.** This was a recurring theme throughout the semester, and there were several reasons for this. Some felt that it would give the Turkish students a chance to learn more about the American culture, and also act as an incentive.

*"There should be a trip from Turkey to the US to understand their culture...and to be motivated. We always discuss this...because they are coming, traveling and of course they are working, we are just working, working, no traveling."*

*"we tried to teach our culture, but we don't think we learned much."*

*"I would have them come to the US, with the one way collaboration we get a lot of their culture and they do not get much of ours. Definitely [a US visit] could be useful."*

Also, some RHIT students appreciated learning about another culture, and felt that it was one of the most important aspects of the trip:

*"You get to experience the culture differently when you have friends here and they can show you around. I didn't know much about Turkey before... it was cool to learn about the history. The cultural aspect was my favorite."*

**Students had difficulties with the language barrier, but believed they improved their verbal communication skills.**

Some responses from the RHIT students regarding communication difficulties:

*"I have worked with [others] from time to time, and [who are] not a native English speakers, but [their] English is very good. It's really nothing compared to working with extremely non-native*

*English speakers. It has definitely improved my ability to communicate visually or to use other means of communication to get around that."*

*"[Over Skype], sometimes when they said something, they didn't pronounce it correctly, and there was signal/noise. ...when they type in English the way I interpreted is not what they meant. That was the greatest challenge."*

*"At various points I would try to communicate an idea, sometimes even if they did not understand/were not clear; there was miscommunication, and we both did different/unexpected things different than intended. Communicating visually more would have helped more, text conversations didn't convey a misunderstanding."*

The BU students also had difficulties with communication, such as:

*"Because we have no non-verbal cues, it is really hard [to communicate] on instant messaging"*

*"Not understanding the difficulties of a second language. They always talk fast, they don't know."*

*"It is very frustrating, when we are trying to complete our sentence, it is hard for us. When we finish our sentence, sometimes their response is 'huh?'. When I try to repeat the sentence, they say forget about it."*

But because of these difficulties, they did feel that they improved their communication skills:

*"[The project] improved our English. Both verbal and in writing. Sometimes in messaging we misunderstood each other because the [difficulty], how to write an email in order to communicate. And I think it helped me a lot with communication."*

**Students would prefer to have the same assessment criteria for the course grade.** Since the courses have different outcomes, each instructor had different assessment tools. While every member of the team got the same grade for a particular phase of the project, the overall grade was different. For example, the RHIT students had to perform some research and make a presentation to meet outcome 2. BU students had to complete a preliminary analysis report at the beginning, and completed weekly peer assessments that included an assessment of weekly participation (meeting attendance, meeting performance, contribution to the team).

**Students wished for a closer match between their skill sets.** While students may consider this a drawback, this is exactly what they will encounter in the workplace and honing the ability to leverage these differences, in the authors' opinions is a goal of these types of projects.

*"We're computer science majors and here it's based on computer education which is different ways of viewing the world teaching that aspect and we just do it for the research and applications aspects. There were a bit of differences as far as expertise goes in that way"*

*"in a domestic group, because we all went through the same curriculum, we have used the same tools, we all use subversion, and we've used eclipse from our first freshman year classes. Everyone having that same knowledge, especially with subversion...in [other projects] we relied on it like a crutch here it*

*is a bit of a change...and we had to change based on those assumptions."*

## 5. Conclusion

Using the student feedback as a guide, and looking at assessments in [2], [5], [6], and [10], the following is a list of lessons learned from the course:

- Choose a project that can draw from the strengths of both groups of students. Because they are from different backgrounds, their skill sets will never be the same, however the project should be selected in a way that all students can feel they have an equal contribution and are adequately challenged.
- Have a limited number of clearly defined project ideas from the client which are communicated to all team members in the same way from the start.
- Have all students begin work on the project together, during the initial visit week, and not before. This would mean that the BU course be restructured, rather than completing a preliminary investigation and starting work on the project early, students may focus their time on learning and setting up collaboration tools to be used during the course, and readings to better understand the aims and outcomes of the course.
- Synchronize meeting times, project deliverables from the outset, according to academic calendars, time changes, etc. We had a tentative meeting time scheduled when students were signing up for the respective courses. However, eventually the meeting was changed to a different time, which resulted in one student being able to attend only part of the meetings.
- Synchronize the weights of the project deliverables for both groups, but also allow for other assessments for differing course outcomes, and communicate this to the students.
- Choose courses from both where students are equally motivated. Participation in the project should be elective. With all the challenges that come with long-distance collaboration, having one group of students less motivated than the other can result in a lot of frustration.
- Expect language to be a barrier. If English is not the native language for any one group of students, it can lead to misunderstandings and stalled work. [2] proposed a solution to limit language barriers, which was to use English as the common language, and ensure students spoke it at least moderately well. In our experience, although this was true of the BU students, language barriers still arose. Even with a moderate ability in English, students still had trouble expressing or asserting themselves in a non-native language, and although they may understand what is being said, the perceived language barrier influences how they interpret its meaning.
- Require students to take responsibility for managing meetings. They should be encouraged to post an agenda in advance, take minutes, and so on.
- Do not expect remote communication among team members to be automatic to the students. As stated in [2], it is important to be clear as to what level of interaction is required. Students should schedule weekly sub-team meetings to discuss details of the project, in addition to weekly team video-conference, and update all team members of the progress during the video-conference.

- Do not expect that students will work at the same/consistent pace. To facilitate continuous work, and to give students incentive to work consistently during each phase (rather than leaving all work until the end), include deliverables such as Gantt charts, so all team members are aware of the work that needs to be done and have multiple document revisions to allow for feedback.

Despite the challenges, students enjoyed many aspects of the course. When asked if the course should be offered again, the following student response nicely summarizes the goals of this experience:

*"[Student would] Definitely recommend [the course] to people who are interested in knowing how people from other cultures think and also if the country is relevant to their future career it is definitely worth going. We are also working for an organization local to the country. See how a project is handled and collaborated from a different point of view."*

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