

## COMMUNICATION IN INTERNATIONAL ACADEMIC VIRTUAL ENTERPRISES

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### 1. Introduction

As industry is becoming more and more global, international companies with business units worldwide are developing products that are aimed to suit global markets. Since knowledge and resources are not always available in one place, working over distance supported by communication tools such as e-mail or video conferencing, is considered a low-cost, fast and promising solution. Furthermore the environment benefits from this solution, as there will be fewer cars on the roads, resulting in lower pollution, traffic congestion and usage of fossil fuel (that are depleting) (George, 2002). Though collaboration in international, interdisciplinary teams unites knowledge, experience and creativity from many locations, the cultural and disciplinary differences can cause difficulties in communication.

This paper was written under supervision of a university mentor by students of the Delft University of Technology who participated in an international academic virtual enterprise. We (the authors) experienced many communication difficulties during our participation. When the project was finished we asked ourselves what could be changed in the academic virtual enterprise in order to improve the communication. This paper gives a general overview of our practical experiences with communicating in the international virtual academic enterprise, set up for the "Global Product Realization (GPR) Course 2005". We will identify advantages, challenges and pitfalls when developing a product in a global academic setting. The communication issues discussed in this paper serve as a source of inspiration for anyone involved in, or planning a global product development project. This paper aims to draw attention to our experiences with cross cultural and interdisciplinary communication based on practical experience rather than theoretical reasoning. The fact that publications on this topic are usually written by staff, rather than by students, makes the paper's point of view unique.

The paper starts by describing an academic virtual enterprise, focusing on the GPR 2005 project in particular. The paper is divided in three main sections based on the different communication flows inside the academic virtual enterprise. Communication between students is the main aspect of this paper.

- Student – Student communication: Communication within student teams.
- Staff – Student communication: University staff guiding students.
- Staff – Staff communication: Impact of staff communication on internal student communication.

## 2. International Academic Virtual Enterprise

Due to globalisation of the business operations, there is a tendency to distribute product realisation and marketing between multiple physical locations (Berggren, 2001). Virtual enterprises are new types of knowledge-related organizations in industry, which enable participants to:

- Work over geographic, economic, ethnographic, historic and cultural boundaries,
- Achieve the best utilization of knowledge, financial and physical assets in business functions,
- Produce and distribute products and services globally (Horváth et al., 2004)

"A virtual enterprise is a dynamic network with cooperation brokers stimulating the cooperation through servicing" (Horváth, 2001).

An academic virtual enterprise is a supportive learning environment that can simulate almost all elements of operation of a virtual enterprise and of operating in a virtual enterprise (Horváth et al., 2004). In the Global Product Realization (GPR) course students from several universities located in different countries, form an international academic virtual enterprise working with one industrial partner. The enterprise is created for the duration of one study semester. The primary goals of the course are to gain professional and communication knowledge and to solve a practical problem assigned by the industrial partner.

### 2.1 Description of GPR 2005 project

In 2005 five European universities participated in the fifth edition of the course: Ecole Polytechnique Fédérale de Lausanne (Switzerland), University of Ljubljana (Slovenia), Delft University of Technology (The Netherlands), University of Zagreb (Croatia) and the City University London (UK). The GPR 2005 students' project task was to develop an innovative spraying device used to treat vineyards. The project was executed for a Swiss company specialised in modern vineyard mechanization tools.

During the course the students worked together in teams of seven or eight students from three or four universities. During the course two one-hour lectures were presented weekly. At least once a week students organized a videoconference with their group. Outside these hours they worked on the project assisted by other communication tools. At the end of the semester the students gathered in Switzerland to build a physical prototype.

### 2.2 Communication tools

A variety of communication tools were available to the students and staff.

- **Videoconference (VC)**; a multipoint videoconference via the internet. Participants talk face to face supported by high quality video and audio.
- **Digital learning environment**; the digital learning environment 'Blackboard' enables students to work together. On 'Blackboard' students share files, hold collaborative sessions and deliver reports to the staff.
- **Instant messenger (IM)**; enables students to communicate in real time via the internet, using text messages (e.g. 'MSN messenger®').
- **Email**; email allows students to communicate and send data files via the internet.
- **Telephone**; audio communication via normal telephone or via the internet, Voice Over IP.

## 3. Communication in an international student team

Although communication is crucial for a successful cooperation, communication problems occurred regularly. Causes:

- Separation by distance precludes real life meetings (paragraph 3.1.).
- The students have different interest levels regarding the project (paragraph 3.2.).
- The students have different cultural and educational backgrounds (paragraph 3.3.).

### **3.1 Communication within international teams**

#### *3.1.1 Use of communication tools*

The main communication tool within the teams was a videoconference system (VC). This was used as a substitute for real life meetings. One-hour meetings with eight students from three or four locations were common during the project.

Instant messaging (IM) was used for informal communication and minor decision making. It was relatively easy to contact each other via IM and students did not have to rely on the VC system, which was not always available.

The main vehicle for exchanging small data files, making appointments and formulating complex problems was email. The digital learning environment was rarely used despite its multi-functional capabilities. It was used mainly to exchange large data files. More familiar tools like email and IM were frequently used.

#### *3.1.2 Comparing communication tools*

During the VC meetings the participating students did not act as individuals. Student groups from each location formed one group with a single opinion. In most instances, one person per location acted as spokesperson representing the opinion of that university. The physical separation of the members formed a barrier, which did not dissolve in a VC meeting.

Meetings via IM had a different character. All the participants of the IM meeting acted as individuals, expressing their own opinions. Students from the same university also discussed with each other, which did not happen in VC meetings. When communicating via IM, the students were usually seated alone behind a computer. This creates an equal distance experience between all students.

VC meetings were scheduled for important decision-making, which seems logical because it is the closest to a real life meeting. Main difference is that via VC subtle aspects of communication, like emotions and some elements of body language are less visible. This makes it more difficult to communicate via VC than in a real life meeting and it influences decision-making negatively. Decisions were often postponed to other VC meetings or done via IM or email. Despite the fact that students using IM and email can not see each other, communication went more smoothly. When team members communicated through IM and email they had more time to express themselves in English. They understood each other better and decision-making was more efficient (see paragraph 3.3.2).

### **3.2 Different interests in the project**

Because the GPR project did not carry the same study load in the curriculum of the participating universities, students perceived the project's importance differently. For some the project was an elective course, for others it was one of the main courses of their curriculum. The university, which scheduled the project as a main course, allocated twenty hours per week. At universities where the project was an elective course, eight hours were allocated per week. Each week four hours were spent on lectures and one hour on video conferencing. This amounted to a 5 to 1 ratio on hours spent, in addition to the standard activities. This discrepancy led to different priorities between the students.

The perception also depends on the students' background. Some universities perceived the project as an engineering assignment only, limited to the development of a new spraying device. Other universities perceived the project as a complete design project, that needed to include a broad problem and market analysis. Students will treat a project in the way they are accustomed to. The staff encouraged the different interpretations: the students were motivated to stick to their perception of the project.

#### *3.2.1 Implications*

The differences in time spent on the project and the student's interest in the project can lead to negative perception of the other group members. Some group members will perceive other members as overachievers. Vice versa, some group members will think of others being less motivated and less

committed to the project. A fair and equal cooperation is hard to maintain due to these different perceptions.

### **3.3 Differences in student background**

Communication between the students of different universities was largely determined by the students' different backgrounds.

#### *3.3.1 Influence of curriculum*

When the student teams are multidisciplinary, their background curriculum influences the communication. This is due to the fact that people from different background have different level of understanding (George, 2002). The differences in design methods can lead to incomprehension between the team members. During the project the students were convinced that the methods used at their university were the right ones. Little consideration was given to alternative / foreign methods. This most likely happened because of routine: it is easiest to work with the methods one is used to. But sometimes it might have happened because of disinterest: students are not interested in a method applied at another university, if it is unlikely they will use that particular method ever again.

Because of these discrepancies the students sometimes did not take work based on an alien method very seriously. They even ignored the method and did the same work according to their own method. This meant double work, which is ineffective within team-collaboration.

A better knowledge of different design methods and of each other's curriculum is needed to improve the communication between students. For example, it is easier to communicate when there is a mutual consensus with respect to professional language (Roozenburg, 1996). The project's staff plays an important role in informing the students about the different methods and in making students aware of the value of knowing these methods.

#### *3.3.2 Knowledge of the common language*

The quality of communication between students with different first languages depends on the knowledge of the common language. Within the project the common language was English. This quality issue was most apparent during communication by means of the VC system. The ability to quickly understand and speak English differed widely between the students. When using the VC system this resulted in some students trying to keep the conversation going and other students trying to understand what was being discussed. The latter were often unsuccessful because they were not able to understand quickly enough what was being discussed. This permeated the inter-student relationship with feelings of inequality. These feelings caused the students with more advanced English language skills to disregard other participants. Sometimes they misinterpreted other students' inadequate English language skills as insufficient skill levels in other respects. This created unintended and unfounded superiority feelings.

As mentioned in paragraph 3.1.2, instant messaging proved to be a better tool to overcome this language-skill problem because the students with marginal English language skills had more time to understand what was being discussed and to formulate their opinions. This resulted in a more equal discussion.

The added value of VC meetings, compared to IM, is that facial expressions are visible and the participants are able to use body language to amplify their opinions. However, it must be emphasised that (also mentioned in paragraph 3.1.2) some relevant body language and facial expressions remain unnoticed when using VC.

#### *3.3.3 Effect of cultural differences*

International team members are likely to experience difficulty in communication due to cultural differences. The most obvious cultural difference in a student environment can be found in the relation between students and staff. For example: for students in some countries it is not customary to disagree with the staff. As a result the staff had a relatively large impact on design and process. In other countries it is not a problem to disagree with the staff; it is sometimes even encouraged to criticize the methods applied. This phenomenon is described by Hofstede (1980) who conducted a comprehensive

study of how values in the workplace are influenced by culture and is measured as Power Distance Index (PDI). PDI focuses on the degree of equality, or inequality, between people in the country's society. A High Power Distance ranking indicates that inequalities of power and wealth have been allowed to grow within the society. A Low Power Distance ranking indicates the society de-emphasizes the differences between citizen's power and wealth (Hofstede). The difference in PDI between the participating countries influenced the communication. At times it happened that a student from a country with a low PDI was having a VC discussion with a student from a high PDI country and suddenly a staff member appeared at the high PDI side giving his opinion on the discussion. The high PDI student immediately agreed with the staff member, while the low PDI member might have disagreed. Regardless of the outcome, the staff member did influence the group discussion severely. The high PDI students saw no use in proceeding with the discussion because the staff member had given his opinion on the topic. Low PDI students might have wanted to discuss further, but discovered this was no longer possible.

Apart from the communication difficulties cultural differences can cause, these differences are also very interesting and provide the students with knowledge they did not have before. Although cultural differences are unlikely to change, students can learn a lot from, for example, the work-ethics of other cultures.

### **3.4 Evolving relation between team members**

During the five months that the students cooperated over long distance, students from different universities had to assess one another. At the beginning of the project teamwork between the students was limited. After the first months had passed, cooperation improved. And when the students met their team members at the workshop they got to know each other a lot better in a short time span. As a result the communication in the group became much better.

Before the workshop, the project groups were divided into sub-groups consisting of students belonging to the same faculty. During the workshop these sub-groups were combined and the students were better able to identify each other's capabilities. This made it easier to divide specific tasks among the group members.

## **4. Communication between staff and students**

Staff and students communicated on two levels: lectures and guidance. Due to the physical distance lectures were communicated through the VC system. When the VC was used for this purpose, the problems that occurred were different from those cropping up during the use of VC for internal student communication. The students also discovered that guidance via VC is different from conventional guidance.

### **4.1 Virtual Lectures**

As far as listening and paying attention to a lecture are concerned, the experience is comparable to conventional lecturing. But as soon as interactivity is involved, the physical distance raises problems: When posing and answering questions, the slight delay in video and audio signal plus the fact that the audio can only come from one place at a time, makes it difficult to have a natural conversation. A quick response or a small remark is practically impossible to make, as it will override the lecturer's voice, which makes the situation confusing and requires relatively much time. Moreover, it is a challenge to draw the lecturer's attention if one wants to interrupt: a student is not likely to be noticed if he waves his hand on a television screen that is not facing the lecturer. Alternatively, a verbal signal would get attention but reluctance to override the lecturer's voice keeps most students from taking that road.

#### *4.1.1 Relevance of the lectures*

Though multidisciplinary knowledge can be seen as an advantage in designing, it can be a drawback for the process of understanding a lecture. Too much prior knowledge can make a lecture redundant and less interesting, whereas too little prior knowledge can create insecurity and loss of interest.

Different levels of prior knowledge can lead to underestimation of students and their curricula rather than generate mutual respect and interest. This can be an impediment for the development of a coherent team.

#### *4.1.2 Social pressure to attend lectures*

As explained above, a mismatch in lecture-content causes disinterest, insecurity and underestimation of project partners. It seems tempting to skip a lecture and spend valuable project-time otherwise. Besides, the distance in video conferencing tends to make the lecturer-student relation quite anonymous. Still, the social pressure to attend the lectures remained remarkably high in the GPR course.

A possible explanation could be common politeness. Since the group of students was very small, the lecturers put in a lot of effort per student and tried to adapt the content to their specific needs. It would be impolite for a student not to attend the lecture. In such a small group a student's absence is most likely to be noticed by the lecturer.

#### **4.2 Guidance**

The students were not the only ones with communicational issues. Because of communication problems within the intercultural and interdisciplinary staff the guidance by the staff was irregular. There was no clear structure to the student guidance process. For example at the beginning of the project the coaching staff members attended the meetings weekly, while at the end of the project they did so only once a month or less.

This led to disagreements between the students since it was not always clear what the staff expected. Combined with the lack of leadership within the teams, this had a negative influence on the project. On the other hand, the minimal guidance resulted in independently operating students, which is positive from an educational point of view. However, some extra guidance would have been helpful to realise a more structured cooperation.

### **5. Influence of staff communication on student's project perception**

The communication between staff of different universities influences the attitude of the student towards the project. In the virtual enterprise this surfaced when certain agreements between students and staff of one university were not coherent with those of other universities. This was illustrated when staff of the different universities held videoconferences between themselves in order to organise the project. At first it was assumed that staff was sufficiently organised preceding the project and that staff from the different countries would act coherently and as one team. This meant that it was confusing when certain aspects beforehand agreed between local students and local teachers would not be recognised at videoconferences by other universities. The cultural differences between staff also caused miscommunication. This led to a situation where students were uncertain as to what was expected of them.

### **6. Discussion**

According to our observation we find that communication in an international academic virtual enterprise is difficult. What makes it so hard to communicate and what should change in the academic virtual enterprise in order to improve the communication?

First of all we conclude that communication via the available tools is very different from a real life conversation and therefore it makes communication difficult. Future developments of communication tools might improve this and maybe some day these differences will be negligible. Until then the limitations of communication tools will be an impediment in long distance communication. Secondly we saw that the interests the students had regarding the project, differed significantly. This was caused by the differences in study load, combined with the differences in curriculum and the course's organisation. The students were insufficiently aware of the differences in study load and curriculum. Because of this, nobody really knew who the best person for a specified task was. It also made it difficult to appoint a leader. However, when we look at these differences, we easily see an

analogy between this particular academic virtual enterprise (AVE) and a virtual enterprise (VE) or any product developing company. In most companies there is a project leader who decides the design direction and maintains an overview of the project. This leader usually is a generalist who, when he needs certain specialised information, engages a specialist for that specific topic. Because the project leader is involved in every product development stage, this usually means that the project leader spends more time on the project than anyone else. When we look at the GPR project we see that there is one generalist's faculty and several specialists' faculties. This generalist's faculty is the faculty that was supposed to put the most hours into the project. If a hierarchical structure had been imposed on the course, the students would have known their task and acted accordingly. Transparency increases mutual respect, which has a positive influence on communication. To improve communication within AVE or VE we recommend operating under a hierarchical structure.

We also recognised that differences in the level of fluency in the common language caused communication problems. To overcome this problem, one could suggest that the selection criteria to be able to attend the course should be 'a good knowledge of the English language'. But a lot of students indicated that one of their motivations to participate in the course was to improve their English language skills. Therefore in this academic setting it would have been inappropriate to apply such selection criteria. By creating more respect between team members, we believe the language problems can be overcome. Respect helps students who are well versed in English to have the patience to listen to students with lesser English language skills. Vice versa, those with less fluency in English will not be intimidated by those with better English language skills and become less anxious to make mistakes when speaking English.

Furthermore, we described the impact that cultural differences can have on communication. Cultural differences are very difficult to change. One suggestion we can think of that could reduce the communication problems due to cultural differences, is to give lectures on this topic preceding the project (using for example Hofstede's work). The knowledge gained from such lectures can increase mutual understanding and respect which has, as discussed before, a positive influence on communication.

The time the students worked together also influenced their mutual respect. We saw that the real life meeting during the final week of the project had a positive influence on the communication, since it is easier to respect a person one knows in real life than one who is known only from a television screen. But before this meeting, the regular meetings also influenced the communication, sometimes in a positive and sometimes in a negative way.

Finally, we saw that confusing agreements with local and international staff often resulted in discouragement. In order for communication between international students to run smoothly, it is very important for the staff of the various geographic locations to be in agreement over how the project will be approached.

## 7. Conclusions

In this project students had to deal with mutual differences in culture, discipline, education, language skills, interests and personality. As described in this paper, any misunderstanding, difficulty or problem in communication is likely to influence team-relations negatively.

We believe that respect is one of the key elements for effective communication. Apart from the methods we discussed to increase mutual respect, we believe that the best and fastest way to gain respect for other students is to meet them in person preceding the project. On the other hand, we felt that the communication difficulties, though frustrating, were perhaps the most educational element of the project. Therefore, in an academic setting, one could argue against meeting before the start of the project. However, in a non-academic VE, we recommend meeting beforehand, combined with the other improvements we discussed. At least until future communication tools will be available which could offer virtual meetings equal to real life meetings.

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