CHALLENGES OF CROSS-ATLANTIC PROJECT COLLABORATION IN DESIGN EDUCATION

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ABSTRACT
The paper reports a survey that was conducted among students who participated in pilot projects organised by the Centre for Design Research of the Stanford University and Decode Research Group of the Helsinki University of Technology. These Cross-Atlantic projects were conducted within multidisciplinary teams consisting of students with various educational backgrounds such as mechanical engineering, industrial design, business administration, computer science, and industrial engineering. The objective of the paper is to discuss the main challenges encountered in the projects. The greatest challenges that students faced in the projects stemmed from disciplinary differences in terms of language, understanding, and working methods. The paper generates insights that are useful also for other instances that are planning global project collaboration within design research and education.

Keywords: Industry based student projects, cross-disciplinary projects, design curriculum development, developing links with industry, teaching tools and techniques

1 INTRODUCTION

Since 2005, Decode Research Group from the Helsinki University of Technology (HUT) has been constructing a research and education approach called "Design Round the Globe" (DRG). The objective is to establish working practices between Europe, United States and Asia in terms of design research and education. HUT, Stanford University (SU, Centre for Design Research) and Kyoto Institute of Technology (KIT, Department of Design Engineering and Management) function as the main activity centres in the plan. HUT and KIT have conducted joint efforts in terms of design research and student projects for over ten years. Joint activities between Decode and Stanford, in turn, started in the academic year 2005-2006, when a Finnish student group worked in a project together with students from SU. Two similar projects followed in the next academic year. This paper focus on discussing the early experiences of Cross-Atlantic collaboration that emerged from these three projects.

2 AIM OF THE PAPER

The paper has two main parts. First, the student projects are briefly described. Second, the paper reports results from a survey that collected impressions of the students that have participated in these projects. The objective of the paper is to discuss the main challenges encountered in the projects. These concern many practical and thematic issues that result from the cross-cultural and cross-disciplinary context the teams

operate in. The results of the survey will be used to enhance the contents and management of future projects and develop the DRG approach.

3 FINLAND-STANFORD STUDENT PROJECTS

The subjects of the survey were students participating in an international product development course, "ME310", organised jointly in SU and HUT. ME310 is "a graduate level sequence in which students work with corporate partners to determine project requirements, benchmark alternatives, conceive solutions, and develop a series of increasingly sophisticated prototypes through rapid prototyping, analysis and user testing" (quote from http://me310.stanford.edu). In the course, student teams thus work in real-life design projects for 9 months. Some teams are internationally distributed, meaning that they include students from Stanford and a partner university outside the U.S. The first team between Stanford and Finland in 2005-2006 consisted of four students (mechanical engineering and computer science) from Stanford and four Finnish students with a multidisciplinary background, derived from the International Design Business Management Programme (IDBM, http://project.hkkk.fi/idbm) in which industrial design, engineering and business students study and work together. In 2006-2007, two further projects with a similar team structure (Stanford 4 + IDBM 3) were executed.

The leading idea in these projects is to build a group (despite the physical distance) and deliver a tangible deliverable for their corporate partner, as determined in the project brief, by using a determined R&D budget. Industrial partners such as Panasonic, GM, and Nokia typically want to follow the process closely and, in the best case, the course work is closely connected to their own R&D activities. Cross-Atlantic collaboration is a challenging aspect and various technical solutions for daily work are obviously needed. In reported projects, students used email, Skype, and videoconferencing as the main communication media. To ensure fluent communication, the students started the course by spending a week together in Stanford and they worked few weeks together in California and in Finland also later in the project.

4 SURVEY

To explore the impressions that the students had of these pilot projects, a brief survey was constructed. The survey consisted of two parts: scale questions and open questions. The students have a possibility to answer the questions anonymously, only indicating their background education. In the first part, respondents were asked to circle a number, on a scale from 1 to 6 (1 very bad, 2 bad, 3 satisfactory, 4 good, 5 very good, 6 excellent), that best described their opinion on the posed questions. In the second part, respondent had a list of open questions that they could answer with free comments. The questions are listed in Table 1.

The questionnaire was sent to 20 recipients, and 11 responses were received on time. Since the n was rather small, bearing weak statistical significance, only mean values, standard deviations, and modes were derived from the sample. These are listed in Table 2 (the most significant questions marked with bold) and briefly discussed together with the findings from the open questions in the following chapter.

Table 1. Survey questions

Scale questions: 1. How would you describe the overall learning experience provided by the project? 2. How would you describe the relevance of the project for your studies? 3. How would you describe the relevance of the project for your future career? 4. How would you describe the level of challenge that the project provided? 5. How would you describe the outcomes/expectations ratio of the project? (Was it worth participating?) 6. How would you evaluate the definition of project objectives? 7. How would you evaluate the clarity of project brief from the company? 8. How would you evaluate the company involvement during the project? 9. How would you evaluate the quality of coaching? 10. How would you evaluate the quality of supporting teaching activities? 11. How would you evaluate the overall quality of overseas communication within your group? 12. How would you evaluate the level of democratic decision-making within your group? 13. How would you evaluate the level of shared understanding within your group concerning the main aspects of the created concept? (Did you think emphasis was placed on relevant aspects?) 14. How would you evaluate the level of cross-disciplinary understanding created within your group? (Did you understand the viewpoints of your peers representing different educational backgrounds?)	15. How would you evaluate the level of cultural understanding created within your group? (Did you understand the viewpoints of your peers representing different cultural backgrounds?) 16. How would you evaluate the level of utilization of team members' specific strengths? 17. How would you evaluate the level of expertise of your overseas team members? 18. How would you evaluate the level of expertise of your own (national) team members? 19. How would you evaluate the usefulness of video meetings? 20. How would you evaluate the usefulness of face-to-face meetings? 21. How would you evaluate the provided infrastructure (technical equipment, facilities, etc.)? 22. What is your overall impression of the project? *Open questions:* 1. What were the major challenges and difficulties you faced in your team project? 2. Did the cross-Atlantic collaboration create major difficulties? What kind of? 3. Did you encounter any cultural differences? What kind of? 4. Did you encounter any disciplinary differences? (stemming from different educational backgrounds) What kind of? 5. What were the main challenges your group faced in terms of company collaboration? 6. Please have a free word…

Table 2. Mean values, standard deviations, and mode values of the questionnaire part 1

No	Question	Mean	St.Dev.	Mode
1	**learning experience**	**5.09**	**0.70**	**5**
2	study relevance	4.27	1.10	5
3	**career relevance**	**4.55**	**0.93**	**4**
4	**challenge**	**5.09**	**0.83**	**5**
5	**outcomes/expectations ratio**	**5.09**	**0.70**	**5**
6	definition of project objectives	3.80	1.51	3

7	clarity of project brief	3.45	1.13	3
8	company involvement	3.45	0.69	3
9	quality of coaching	4.05	0.79	4
10	quality of teaching	4.05	0.91	4
11	quality of overseas communication	3.59	0.86	3
12	democratic decision-making	4.06	1.87	4
13	shared understanding	3.65	1.52	4
14	cross-disciplinary understanding	3.73	1.27	5
15	cultural understanding	4.45	0.69	5
16	**utilization of team members' strengths**	**2.82**	**1.08**	**2**
17	expertise of overseas team members	4.14	1.00	5
18	expertise of own team members	4.27	0.65	4
19	usefulness of video meetings	4.18	0.98	4
20	**usefulness of face-to-face meetings?**	**5.73**	**0.47**	**6**
21	infrastructure	4.22	1.25	4
22	**Overall impression**	**4.64**	**0.67**	**5**

Scale: 1 very bad, 2 bad, 3 satisfactory, 4 good, 5 very good, 6 excellent

5 DISCUSSION: CHALLENGES OF TEAM WORK

Students seemed to have good overall impression of the projects. They provided a very good learning experience, offering also good relevance for their future career and current studies. Moreover, students experienced good outcomes in terms of their prior expectations.

The projects were also considered highly challenging due to various issues indicated both by the scale questions and open questions. Four main groups of challenges were identified by the questionnaire: stemming from cross-Atlantic collaboration, cultural differences, disciplinary differences, and company collaboration.

5.1 Challenges of cross-Atlantic collaboration

Overseas communication was generally considered between satisfactory and good. It did not create major difficulties for most of the respondents but required lots of additional effort and work due to long physical distance. Challenges were created through the time-zone differences between Helsinki and Stanford, often resulting in delays and gaps in project execution. Set deadlines were sometimes difficult to keep. Video communication, through which a great deal of interaction took place, was experienced challenging. A natural atmosphere was difficult to create, and major technical difficulties occurred. It also seemed that the team were too big for this context. Face to face meetings, in turn, were found highly valuable for teamwork. In addition to offering a way better media for discussing the expectations, goals, and execution of the projects, they offered a good platform for informal communication, being together, which is extremely important in this type of projects but which occurs scarcely in video or phone meetings. Overall, some respondents missed more frequent communication. Another challenge, particularly for Finnish members, was the fact that most of the main activities around the course took place in the Stanford campus.

5.2 Challenges of cultural differences

Cultural understanding within the teams was assessed between good and very good, and the opinions of respondents were quite consistent. The expertise of overseas team

members was also well valued. Some of the respondents had experienced minor language barriers, but not major ones. Generally, different cultural backgrounds seemed to create considerably less challenges than disciplinary differences. Some opinions stated that Americans were more outspoken and freer to express their feelings and emotions than Finns who were more reserved and hid their thoughts. Such conceptions are often stereotypical. One respondent, for instance, had a totally contradictory experience. All in all, personal qualities are presumably much more significant than cultural differences. Differences were also found in working methods and styles between Finland and SU. For example, Finns were reported to put more emphasis on background research, while Americans stressed the actual concept development, much of which also originated from different disciplinary conventions.

5.3 Challenges of disciplinary differences

"Once upon a time there was an engineer who believed that marketing was pure 'bullshit' and that the product sells with it functional and technological features. Industrial designer instead thought that a product is only a physical piece and that it is mostly sold because of its cool appearance and functional features. The designer also believed that the process of developing a product starts from the technological and physical product perspective, not for example from customer needs. Then there was the rest of the group, who saw the product wider, from core benefit to potential. This meant considering and developing the product from the perspectives of styling, look and feel, performance, features, technology, target market, meaning, psychometrics, price, brand strategy, and possible business plan. In this diverse team it seemed like everyone had understood the product development process differently, some hadn't at all…" (quote from a respondent)

In the multidisciplinary teams, differences in respondents' educational backgrounds seemed to cause the greatest challenges and difficulties. There seemed to occur surprisingly low utilization of disciplinary strengths, resulting from lack of understanding of the different roles and potentials of team members. Shared understanding and cross-disciplinary understanding was rated between satisfactory and good, but there occurred quite much variation. Different disciplines were also reported to have different areas of interest. Many difficulties were created by the uneven disciplinary distribution of the teams. For instance, there was only one industrial designer and six engineers in one group.

Lack of cross-disciplinary understanding meant that effective and efficient communication was a big challenge. Communication was also hindered by problems in terminology. Moreover, finding common language and abstraction level was sometimes difficult. The concept of product, for example, was rather differently comprehended: as a functional prototype by mechanical engineers, and as a broader entity by industrial designers and business students, as illustrated by one respondent.

Major differences occurred not only in thinking but also in working methods and styles. Members were strongly using their own disciplinary methodologies, some of which were quite developed and difficult to readjust to the project context. ME310 has originally been a mechanical engineering course, which made it often difficult for students from other disciplines to find support for their views and methods. As the result of difficulties in cross-disciplinary understanding, reaching proper conversational dialogue was sometimes difficult. Ideas needed to be very simplified in order to create common understanding within the group. Eventually, diversity was considered strength when properly handed. Willingness to understand also existed among students, as

respect towards the views of different disciplines was acknowledged. Guidance would, however, be needed in future projects to increase the social expertise of students.

5.4 Challenges in company collaboration

Definition of project objectives, clarity of project brief, and company involvement were generally assessed between satisfactory and good. Some respondents found companies quite distant and wished for more frequent and closer contacts with them. The location of the company in the US was also a challenge particularly for Finnish members that consequently had fewer contacts with their representatives. There also occurred different understanding of the project brief, mainly caused by disciplinary differences in understanding the essence of the challenge. Teams generally spent lots of time clarifying the brief and applying it to the views and interests of different disciplines. Some students also lacked experience in working with companies, which resulted in some misinterpretations ineffective execution of the project.

6 CONCLUSIONS

In addition to the above four challenges, there were other generic reasons identified. Personal motivations, aims, and enthusiasm naturally played a big role in the execution of projects. However, as noted, the multidisciplinary nature of the work seemed to create the biggest challenges and must be carefully addressed in future projects. More guidance and education of multidisciplinary work may be needed. Strengths of each disciplines and their different conceptions need to be explicitly discussed. This could result in a clearer breaking of the project into disciplinary tasks and tasks that the whole team is responsible for.

Of course, many challenges reported in this paper were highlighted because of the pilot nature of the projects. The strong multidisciplinary aspect was tried for the first time in ME310 that is otherwise a well established and acknowledged structure. Overall, the projects generated positive results and encouraging feedback from the students. Firm ground exists on which the Design Round the Globe approach can be further developed and extended to include collaboration on three continents. This is motivated by the survey results that suggested that cross-cultural challenges were considered surprisingly small. Of course, Finnish and American cultures, habits, and working styles are relatively close to each other. When bringing, for instance, Japanese students into the picture, cultural considerations presumably create greater challenges.

In order to provide stronger generalisations with regard to the studied themes, the number of respondents in our survey was too small. In the future projects the plan is to gather more systematic data to generate profound knowledge concerning multidisciplinary design collaboration in the global context.

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