

## TEACHING GROUP DYNAMICS TO ENGINEERING FACULTY

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### ABSTRACT

The introduction of CDIO design–build–test activities into the curriculum leads to an increased need of handling different types and also different sizes of groups of students, i.e. students have less or non experience of working in workspaces, skills of handling tools and machines differs and also sizes of groups it self could be a difficulty. Faculty members involved as supervisors for students conducting design–build–test courses often have difficulties to give proper advice and basic counselling of group dynamics issues for students. When the group doesn't work as a group, solving problems and tasks will be delayed or sometimes not solved at all and grades will be affected for the members of student group.

In order to help faculty members in their professions as supervisors, two engineering programmes from Chalmers University of Technology and Royal Institute of Technology have developed a model to bring faculty members from different universities and programmes together, solving and preparing supervising group dynamics difficulties aroused from students in their work in groups.

The basic idea and reason to have faculty members from different universities, was to focus on the common problem, but not only, the reason was also to build alliances and tear down barriers for talking and discussing supervising problems among faculty members. The model uses two course days of teaching and workshops. It has been used for two years and has been a success for those who have followed it.

This report will present the model and a more thorough evaluation of the outcome. If and how, the impact have been to faculty members, but also how the knowledge, gained during the course, have been used both in teaching and supervising students. The evaluation also aims to find out why some faculty members have not used this opportunity to increase their supervising skills and handling students working in groups. The survey was conducted during the spring of 2006.

### BACKGROUND

The reason to introduce a clear line of group dynamics into engineering education is solely based on the fact that most graduated students work in a team-based environment. Benchmarking a sample of engineering syllabus and comparing especially the content of interpersonal skills gave the result that group dynamics is the major gap between what engineering educations teach today and what the industry and other stakeholders want us to teach, see [1] and [2].

Interpersonal skills are very important in forming effective teams. To meet this, a number of different formal student group activities have been issued within the CDIO-initiative,

e.g. design-build-test activities, see [3]. The number of formal group activities has increased in the engineering curricula and also the demands to handle groups when the dynamic in the groups does not give any or very little added value in problem solving.

To meet aroused demands from both students and faculty members working in and supervising groups in different situations a number of activities have to be initiated.

This paper does not focus on, or its intention is not to cover directly how student can be supported to handle group activities rather how faculty can be helped supervising students in group activities.

## **INTRODUCTION**

Group dynamics for faculty is a course given each term since autumn 2004 and it is a cooperation of two different engineering programmes and universities, Chalmers University of Technology and Royal Institute of Technology.

The course has been given three times and the number of attendants is in total 47 faculty members (20 % women) including autumn 2005 and they are equally distributed between the universities, N.B. as a reference the number women in the faculties varies from 23 % at Royal Institute of Technology and 24 % at Chalmers University of Technology. The numbers of attendants that have fulfilled all course requirements are at this writing moment 20 faculty members.

The course has to have at least 10 but not more than 25 participants. The group dynamics within the course it self should also be fulfilled. The course uses the form of lunch-to-lunch at each university, i.e. the course starts with a lunch for all participants and ends the next day the same way. Each visit requires two days including transportation.

## **COURSE OBJECTIVE**

The course will explore the interactions between individuals and the system in which they work. Individual and group levels of analysis are included in covering such topics as communication, group development and performance, individual effectiveness and development and leadership. The goal is that by understanding group dynamics teachers will improve their ability to tutor and support students working in groups, see also Appendix A.

## **SURVEY**

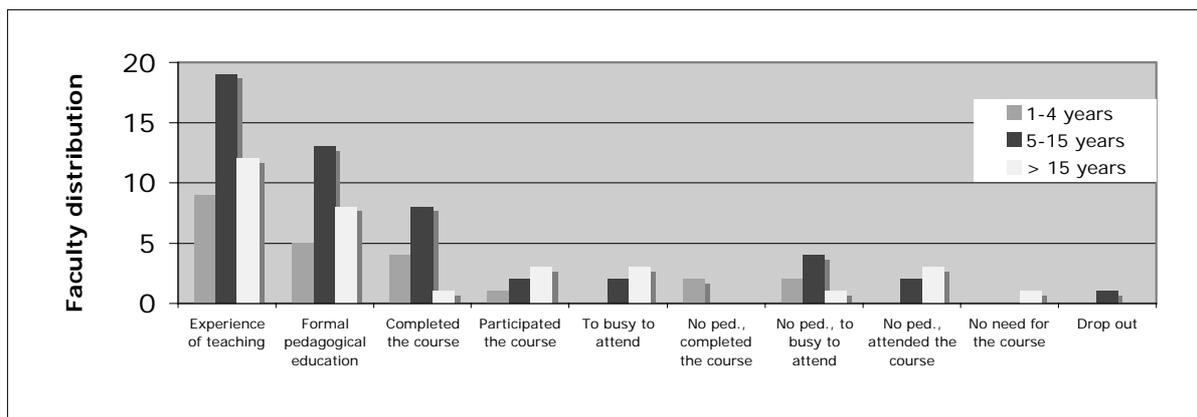
The survey was sent out by email at each university at the end of Mars 2006. It was sent out to faculty members; the same that also has been offered to attend the course. 17 questions have to be answered; 7 on background questions, 4 on handling the course, 3 on using course content on student groups and 2 on the course format.

The background questions should answer the faculty members: pedagogical status, age and years of teaching. Handling the course questions should answer: reason for attend, reason for fully attend and reason for not to attend. Using course content questions should answer: if content is useful and adequate, reason using and not using the content. Course format questions should answer: if it is useful to keep the format of the course and if it gives added value to mix faculty members from two universities.

## RESULTS

40 faculty members responded the questionnaire (23 % women) and the distribution were: 15 have completed the course, 8 have attended, 3 have partly attended (these two groups are added, i.e. 11 participants), 13 were interested but too busy to attend and 1 felt no need of the course.

The respondents could easily be divided into three groups based on the number of years working as a teacher, 1-4 years (mostly PhD students), 5-15 years (lecturers and younger professors) and more than 15 years of experience of teaching (senior lectures and professors), see Figure 1.



**Figure 1:** Respondent's background and course handling.

The respondents could of course be grouped differently but to keep down the number graphs we decided only comment each cluster of importance instead.

### Those who completed the course

- All but two of those who completed the course have also other pedagogical education from their own university. From the same group almost half of the members also had pedagogical education from other universities.
- Younger faculty members completed the course more frequently.
- All except for two of the participants applied the contents of the course.
- All of the participants were very positive about the format of two universities collaborating.
- Most participants were recruited by email and/or personal invitation.

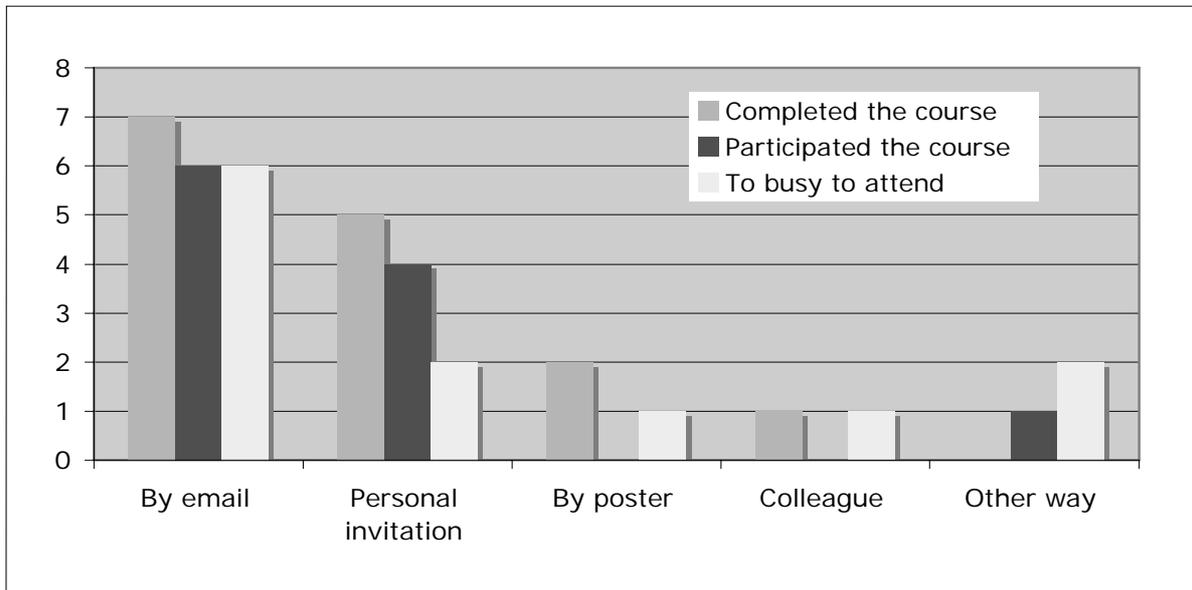
### Those who partly participated in the course

- Most of them had over 20 years of experience from teaching. Half of them had other pedagogical education.
- 25% of the participants applied the course content.
- All the participants were positive about the format with two universities collaborating.
- Lack of time was the main reason why the participants didn't (yet) complete the course.
- They were mostly recruited via email and personal invitation.

### Those who did not participate in the course

- Most participants were recruited by email and/or personal invitation.
- Less faculty members had any pedagogical education, about 23 %.
- Lack of time was the main reason for not participating.
- All except one were interested in participating later.

- They were less positive about the format of two universities collaborating this way. Mostly because of the travels from Stockholm to Göteborg or vice versa (to time consuming).
- Most of them got information about the course from email.



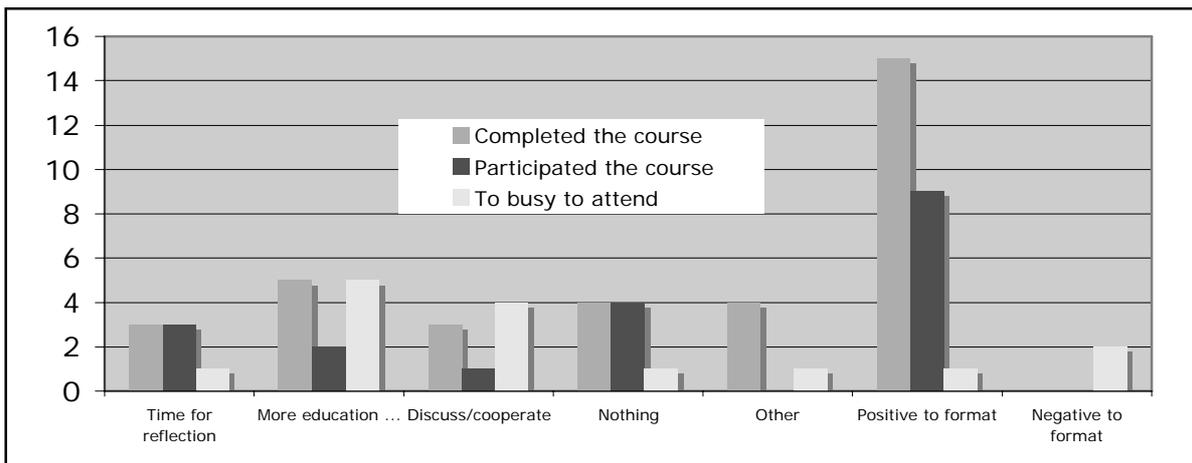
**Figure 2:** How faculty got information about the course.

### Other general results

One of the questions were; "In my work with student groups I miss..."

- 1) Time for reflection
- 2) More education in group dynamics
- 3) Someone to discuss/cooperate with
- 4) Nothing
- 5) Other

, see Figure 3.



**Figure 3:** Pedagogical need of support and the attitude to two universities cooperating in this course.

## DISCUSSION

Invitation to participate in the course was sent via email and via personal contacts. Most of the faculty got the information from email. To reach and have an impact on the faculty an email list of the members and personal contacts to more influential faculty members is enough for invitation. The influential faculty members give credibility and will act as early adopters for this type of course for the whole faculty.

All those who participated appreciated the course. Not all of them completed the course though; approximately 68 % has some part of course unfinished. This is mostly due to lack of time according to the answers. Younger faculty members with pedagogical education completes the course in due time. The content of the group dynamic course was applied in the various courses by the faculty. The answers gave also the result that there is a need of a follow-up or some sort of reflection concerning supervising groups of students and group dynamics.

The format of the course – lunch-to-lunch meetings, two universities involved – was highly appreciated of those who participated. It was highly appreciated to be able to discuss with colleagues from different universities. The fact that the course includes some travelling to Göteborg/Stockholm is also very positive. It is regarded as something “extra” and out of the ordinary.

The main reason for not participating in a course of group dynamics is lack of time. Faculty with long experience of teaching but with no formal pedagogical education was representative to this group. They wanted further education in group dynamics but they did have problems re-scheduling their agendas. Furthermore, they wanted to discuss pedagogical issues and cooperate with other members of the faculty in their teaching.

The format of the course – lunch-to-lunch meetings, two universities involved – is not a complete success for all. The reason is again lack of time. Travelling between Stockholm and Göteborg is time consuming. They also point out that it is very important that further education is scheduled yearly in the faculties' agendas.

## CONCLUSIONS

There is a need for further education of faculty in group dynamics. Chalmers University of Technology and Royal Institute of Technology should continue to offer courses in group dynamics in the present form. The faculty members who had fulfilled the course are more confident in supervising and handling groups of students.

Further pedagogical education in e.g. group dynamics needs to be formally planned in the yearly schedule for faculty members.

## REFERENCES

- [1] Bankel, J., Berggren, K.-F., Blom, K., Crawley, E. F., Wiklund, I., Östlund, S., “The CDIO Syllabus – A Comparative Study of Expected Student Proficiency”, *European Journal of Engineering Education*, vol. 28(3), 297-315, 2003.
- [2] Bankel, J., Berggren, K.-F., Engström, M., Wiklund, I., Crawley, E.F., Soderholm, D.H., El Gaidi, K., Östlund, S., "Benchmarking engineering curricula with the CDIO Syllabus", *International Journal of Engineering Education*, vol. 21(1), 121-133, 2005.

- [3] J. Malmqvist, P. Young, S. Hallström, J. Kutteneuler, T. Svensson, "Lessons Learned from Design-Build Test-Based Project Courses", Presented at Design-2004, Dubrovnik, Croatia, May, 2004.

## APPENDIX A

# Group dynamics

## Course PM for teachers

Why a seminar on group dynamics – the knowledge on human interaction?

Projects are a common way to organize work both within education and working life. Our engineering students will take part in project work where high expectations are put on the ability to interact and collaborate efficiently. To meet these expectations they need to learn more about what is influencing and determining human behaviour in groups.

Course name: Group Dynamics

Examiner: Susanne Ollila

Course leader: Susanne Ollila, 772 8414,  
*susoli@chalmers.se*

Merit points: 2

Examination: Compulsory participation, mini research, reflective thesis

## Group Dynamics

### Course overview and objectives:

The course aims at providing an understanding of basic human dynamics when working in projects. As such the course provides an opportunity to investigate and experience processes and mechanisms which have their basis in the applied behavioral and social sciences (psychology, sociology, etc.). These processes and mechanisms have great impact on the working climate and the results that project groups deliver.

The course will explore the interactions between individuals and the system in which they work. Individual and group levels of analysis are included in covering such topics as communication, group development and performance, individual effectiveness & development and leadership. The goal is that by understanding group dynamics teachers will improve their ability to tutor and support people working in groups.

Teachers will achieve learning as follows:

- Knowledge of behavioural science theory and concepts as applied to work groups.
- Understanding the dynamics of work groups.
- Improved communication and listening skills.
- Improvement in the capacity for empathetic thinking and action.
- Development of the tutoring skills of analysis, problem-definition, decision-making, and implementation.
- Development of leadership skills in tutoring student groups.

### The educational process:

The underlying assumption is that human behaviour is to a high extent the result of social interaction with others and that learning is best acquired by multiple means. The focus of this course will be experiential, engaging the teachers actively in the learning process. In addition to conceptual inputs, the course will utilize structured and unstructured exercises, case analysis and reflective discussions in order to: a) provide teachers with the opportunity to actually experience the behavioural dynamics being studied; and b) to provide situations wherein teachers can assess the relevance of the dynamics being studied.

Each member of the class will be randomly assigned to a team. Team formation will be made in before hand by the course leader and will be for the duration of the course. The purpose of the teams in this

course is to provide a vehicle for learning about self and human behaviour.

### **Course design:**

The course includes two seminars one at Chalmers University of Technology and one at the Royal Institute of Technology. Each seminar starts with a lunch day 1 and ends with a lunch day 2. Before seminar 2 each one are supposed to conduct a mini research study which means that they will intervene with and analyze the consequences of different communication strategies by using course literature. Moreover each teacher is supposed to hand in a reflective thesis (3 pages) with the heading "My task as a tutor". In this thesis the teachers reflect upon their role and discuss it my means of the course material.

Because much of the learning and work towards the achievement of course objectives will occur in the classroom, students must 1) attend class regularly, 2) be fully prepare for class and 3) contribute to the team and class discussions.

### **Examination:**

The teachers must attend the two seminars as well as do the intervention study and the documentation connected to that and hand in the reflective thesis in order to pass the course. The grading is pass or non-pass.

### **Literature:**

Maltén, Arne, (1998), *Kommunikation och konflikthantering: En introduktion*, Sverige: Studentlitteratur AB.

Recommended additional reading:

Engquist, Anders, (1997), *Om Konsten att Samtala: En bok för människor i kontaktyrken*, Sverige: Prisma

Bokförlag.

Hammar Chiriac, Eva & Hempel, Anders [ed], (2005), *Handbok för grupparbete – att skapa fungerande*

*grupparbeten i undervisning*, Lund: Studentlitteratur.

Lenneér-Axelsson, Barbro & Thylefors, Ingela, (1998), *Arbetsgruppens psykologi*, Stockholm: Arbetarskyddsnämnden.

Smith, Karl A., (2000), *Project management and teamwork*, US: The McGraw-Hill Companies.

### **Schedule:**

#### **Seminar 1,**

Day 1

Lunch

Course introduction

Basics of group dynamics

Group exercise – the role of the tutor

What influence collaboration

Group exercise – the puzzle

The group life cycle

How can we as tutors support the student

groups?

Joint dinner

Day 1 ends

Day 2

Group exercise – the till

The laws of gestalt/perception

Communication

Group exercise – mutual learning/dialogue

Summary of "What did I learn"

Introducing the intervention research study

Lunch

#### **Seminar 2,**

Day 1

Lunch

Questions and reflections

Introducing seminar 2

The interventions research study results

The pedagogical dialogue

Being a tutor is being a leader

Discussion and reflections

Day 1 ends

Joint dinner

Day 2

Conflicts and how to handle them

To give feedback

Group exercise – A prisoner's dilemma

Summer of what we learnt

Course wrap-up and examination

Lunch