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FORMING EFFECTIVE CULTURALLY DIVERSE WORK TEAMS IN PROJECT COURSES

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ABSTRACT

A culturally diverse student population at Master's level is a reality at many universities today, as it is at Chalmers University of Technology in Sweden. However, a common issue is the lack of interaction between home and international students, which counteracts university goals of fostering intercultural cooperation.

This paper will discuss and evaluate a pilot project in one Master's program in production engineering, where activities around group diversity were integrated into a company-based project course. Students were assigned groups where a mixture of backgrounds and expertise were prioritised.

The project used a number of group dynamics activities including a pre-survey of expectations of group work; negotiating a group contract; and continuous peer group assessment in order to develop and reflect on the skills required in a culturally diverse work team.

From reflective essays that students wrote, as well as interviews carried out, the project and tasks were evaluated. The following themes were identified: attitudes to diversity; the importance of well-functioning communication; and attitudes and roles within the group.

Results show that students found this a challenging but useful environment to work in and found the group dynamics activities helpful in negotiating this environment. Continuous peer group assessment, in particular, was seen as helpful in providing a forum for feedback and discussion on individual performance in the group and challenges for the group as a whole.

Recommendations include constructive alignment within the program in terms of clear goals, activities and assessment, in order to build up these skills and awareness, not only in a single course but throughout the program.

KEYWORDS

Culturally diverse groups, project courses, team-member assessment, Standards 3,7,8

INTRODUCTION

Many universities are international environments with mixed student populations. In response to this, there has been much discussion about how to create a useful working environment to utilise this diversity (Carroll and Ryan, 2007; Leask, 2015; Ryan,2013). Some of the examples

that have been presented at CDIO conferences are improved introductions to Master programs for international students (Knutson Wedel, 2010), intercultural training for students (Josefsson,2010) and a global village (Gourvès-Hayward, Morace, & Rouvrais, 2013).

This article presents and reflects upon an integrated course based solution where students receive training and support in their diverse groups in order to improve both the work process and mutual understanding. As supported in the references given above, both home and international students need skills in diverse teamwork and intercultural communication (see CDIO syllabus items 2.4.2, 2.5.2, 2.5.5, 3.1.1, 3.2.2, 3.2.10 and 4.1.6). Therefore, we argue that by integrating such activities into existing courses, all students can benefit, not just in terms of more successful group work, but also in aiding better mutual understanding on campus.

INTEGRATING HOME AND INTERNATIONAL STUDENTS IN GROUP WORK

Minimal interaction between home and international students on campus is a well-documented issue (De Vita 2002; Gourvés-Hayward, Morace and Rouvrais, 2013; Knutson Wedel and Persson, 2010; Leask 2009; Summers and Volet 2008) and is similarly the case at Chalmers University of Technology where a survey we conducted in 2015 showed issues with classroom interaction. This lack of interaction is understandable in some ways; since international students join the education in the fourth year of studies in Sweden (at Master's level, the language of education changes to English), the Swedish students have already had three years to get acquainted, and by Master's level, students are typically very focused on completing their education.

Though understandable, this lack of interaction is problematic from a university, company and CDIO perspective. From a university perspective, diversity has been lifted as a core value at Chalmers and there are clear goals connected to cooperation, including that "The learning environment must foster intercultural cooperation" (Chalmers University of Technology, 2016). From a company perspective, companies are striving towards a diverse workforce (see, for example, www.volvogroup.com) and it is an advantage if a student can demonstrate this experience. From a CDIO perspective, there are particular syllabus items which refer to working in diverse groups, where the importance of engaging and connecting with diverse individuals is stressed. Thus, this interaction needs to be encouraged at Master's level and this focus is similarly reflected in the same policy document mentioned above at Chalmers: "Create global perspectives by setting learning targets for insights related to norms, attitudes and values in all Master's programmes" (Chalmers internal policy document, 2016).

There are a number of ways of encouraging interaction between different student groups, both within formal and informal curricula (Gourves-Hayward et al, 2013; Knutson Wedel and Persson 2010; Leask 2009). The initiative described in this article focuses on group work within courses for a number of reasons. Firstly, project work in groups is a key aspect of engineering education at Chalmers and elsewhere, partly due to the fact that the ability to work in groups has been seen to be crucial at company level. Secondly, interviews carried out with international Master's students from a range of cultural backgrounds at Chalmers have shown that this is one aspect of Swedish education which they react to as being different. Thirdly, group work is an ideal opportunity for intercultural cooperation to take place (Leask 2009; Summers and Volet 2008).

However, there are a number of issues with working in mixed groups. Diverse groups can experience more conflict (Ayoko, 2007) and home students are not always positive to being mixed (Summers and Volet, 2008), believing that it can have a detrimental effect on their grades (De Vita, 2002). Leask (2009) argues that it is essential to consider constructive alignment in the course from an intercultural perspective as well, such that relevant intercultural learning objectives are included in the course goals and assessment activities take into account the intercultural competencies. She also argues that the purpose and value of the

interaction need to be understood; that students need to be assisted to develop the skills they need to engage with each other; that they should be provided with the opportunities they need to engage effectively, and that they should be rewarded appropriately for their achievements.

This article discusses one pilot project course at Chalmers where students worked in culturally mixed groups. In this course, intercultural interventions were adopted to support them in this process. The article will both describe and evaluate these interventions, and discuss whether these can provide a way forward in working with diverse teams and meeting the CDIO goals.

PILOT PROJECT COURSE: PPU171 INDUSTRY PROJECT

PPU171 Industry Project is a 7.5 credit course given over nine weeks as an optional course for students in their final year of M.Sc. studies at Chalmers University of Technology, just before they start doing their Master's theses. Prior to this course, most of the students have worked in groups to solve a given task in other courses, making use of, for example, group contracts. Despite this experience, issues with group dynamics and teamwork have been raised in PPU171 as the students have had issues working together. The purpose of the course is for students to learn how to solve real industrial problems by applying previously learnt established engineering methods, work in teams and effectively communicate to various stakeholders through active collaboration in a project group. Some of the key learning objectives of the course are:

- Formulate a clear problem and create a project plan
- Assess engineering solutions from the perspective of sustainable development, with consideration to both scientific and ethical aspects
- Work in project teams and analyze the project work in terms of group dynamics
- Develop project results following an established project methodology
- Write a technical report that follows an established structure and policies of academic honesty

One student commented that: *"This project is different from other projects. Projects engaged previously were well constrained by the course content and leaded by the same examiner. This project is totally different" (Asian student*)

Out of the 31 students who elected to take the course, 17 were international students, mostly from India, but also from China, Greece, the Netherlands, Lebanon and other countries in Asia, Europe and Africa. The international students had a Bachelor's degree in an engineering discipline from another country, while all Swedish students had a Bachelor's degree in engineering from Chalmers University of Technology. All of the students were from the same Master's programme, Production Engineering; however, there was some diversity in the elective courses they had taken, ranging from Simulation of Production Systems, and Change Management and Improvement Processes to Metal Cutting, and Robotics and Manufacturing Automation.

The Swedish students received a lot of input and experience regarding group dynamics and working in groups in their Bachelor program, while most of the international students had very limited experience with group work, apart from as part of the other electives they took on the Master's program. The 17 international students were divided into six groups together with the 14 Swedish students based on each student's previously taken courses to ensure that all groups were multicultural and had a diverse skill-set. The additional course the students took alongside this course was also factored in to create groups that had similar schedules. Each group contained approximately five students.

The groups were given a real, vaguely defined industry problem, a supervisor from the respective company as well as a supervisor from the university along with some guidance in how to conduct their projects and how to create a project plan. Each group had a meeting with their supervisors the first day and started working on defining and specifying precisely the problem they intended to solve during the course right away, as the given problem was too broad and vague to realistically be fully solved in only nine weeks of half-time work.

In terms of support, the students received supervision from both the industry and the university, and input on project planning and presentation techniques as well as the group diversity sessions described below. The assessment of the course is based on the following elements: the project report, an individual presentation, a peer evaluation where each student grades themselves and their project colleagues, and an optional reflection hand-in regarding group dynamics.

GROUP DIVERSITY SESSIONS

Within the overall course setup, two teachers from the Division for Language and Communication at Chalmers helped facilitate team-formation [CDIO 3.1.1] and group processes. Previous runs of the course had included some group dynamics input, with students working through group contracts, team member - and self - assessment criteria, and a reflection at the end of the process. The new changes in the course aimed to develop these existing activities by introducing aspects of intercultural communication in order to encourage students to take a broader perspective [CDIO 4.16] when agreeing on ways of working within their team [CDIO 2.5.2], and accommodating diverse educational and cultural backgrounds [CDIO 2.5.5]. This took the form of a seminar early in the project, individual group meetings in the middle of the project and a final half-class seminar at the end of the course. During the process, this broader perspective was linked to students' work with group contracts, the team-member assessment, and other activities.

Activities

Seminar input covered aspects of intercultural communication and diversity, primarily aimed at promoting the discussion of various, differing viewpoints (CDIO 2.4.2) and on raising awareness (CDIO 4.1.6). However, the main focus was to work with the students in a hands-on way, in a number of different activities.

Group diversity survey

The students had completed a survey prior to the first seminar, and this was used as a starting point for discussions of values, openness, diversity, and views on how groups and individuals should act to promote teamwork. For example, the survey showed that all students strongly agreed on the importance of 'showing respect'; however, their views on 'respect' differed, and they were given the opportunity to discuss what respect and other similar terms mean, with the aim of agreeing upon ways of showing respect within their group, which could then be incorporated into their group contract.

SWOT analysis

Another activity used to facilitate the writing of a group contract was a modified SWOT analysis (in this case, Strengths, Weaknesses, Opportunities, and Fears), which prompted the students to reflect individually on the group, before further in-group discussions. The premise was that in reflecting on strengths and weaknesses, students would be better equipped to understand their own potential role and contribution within the group. Discussing opportunities encouraged the students to work with their initial impressions of the team-members, and explore ways of utilizing the broad range of backgrounds and competencies. Finally, the students reflected on

fears in order to anticipate potential problems, and discuss ways of either avoiding crisis situations, or resolving them when they arise.

Group contract

Both the survey and SWOT analysis facilitated the writing of a group contract. The group contract consisted of four broad areas – meetings, tasks, attitudes, and group issues – with prompts and suggestions for possibly relevant discussion points. The students had significant freedom in the length, focus, and attention to detail in the contract; they were encouraged to take a broader perspective, where possible, by discussing what the contract actually meant to them. This involved unpacking key terms and agreeing on what they would mean to the group. For example, can they agree upon ways of showing respect in a meeting? Is coming to meetings on time something which the group values? In working in this way, the students were required to exchange cultural information, directed in a meaningful way to the task at hand, which Leask (2009, p. 211) argues is "central to improving the interactions between international and home students."

Team member assessment

Another activity, used primarily to facilitate discussion and feedback within groups, and to a lesser extent for assessment, was the team-member assessment. Each student assessed themselves, and each member in the group, based on a set of criteria with a 5-point Likert scale, covering six main areas. The decision was made to modify the existing team-member assessment from previous years, rather than develop a new assessment, as the focus was on developing an integrated, course-based solution. Although Likert-scale assessment tools for intercultural competence have been criticized (Dervin, 2010), the criteria was used primarily to generate discussion rather than for assessment, which partially overcomes some of those criticisms. Additionally, the criteria had a focus on group dynamics, rather than cultural competence; it was the students' task to interpret and work with the criteria from a broader perspective. The criteria were revised throughout the process, based on teacher discussions and on input from students, in order to:

- address overtly Western-centric descriptions; for example, "addressing conflict directly" was required to score highly in one conflict resolution criteria, which might be perceived as favouring certain cultures' approaches to conflict. This was changed to "Addresses conflict constructively, helping to manage/resolve it in a way that strengthens overall team cohesiveness and future effectiveness."
- break broad criteria down into smaller sub-criteria; for example, "gives and receives honest feedback on others' work" was separated into two separate criteria.
- add detail to some descriptions based on student feedback; for example "shows up to meetings on time" was changed to "shows up to meetings as per agreed upon expectations (e.g. on time, or as per some other agreement)".

The team-member assessment was used in two, separate meetings, at different points in the project, as a tool to promote constructive feedback within the group. Teachers collated the results each time (average score for each criteria) and made them available only to each individual student, and not the group. The students were clear that the results and discussion from these two meetings would not affect assessment, and that the criteria and conversation during the meeting would remain confidential. They were given time in both meetings to interpret the feedback they had received, and then freedom to discuss any issues and possible ways forward, including discussions about the group contract. In contrast to the first two assessments, a third team-member assessment was used to partially influence grading decisions in cases where students seemed to have put in significantly more, or less, work during the project. This was a condensed version with students only able to assess based on

six main criteria areas; the sub-criteria descriptions in each main area remained visible, but students only responded to the overall, main criteria, in order to reduce student workload, and get general, overall impressions, rather than specific responses to each sub-criteria. The collated results of this assessment was not seen by students, and this was the only context within which the team-member assessments actually had the potential to influence assessment.

Other activities

Two more in-class activities are of interest. In a final meeting, which started with some input on conflict management, students reflected on the Thomas-Kilmann conflict mode instrument (see, for example, Brown, 2012) by positioning themselves spatially in a room, to reflect upon which of the five approaches to conflict (avoiding, competing, compromising, accommodating, and collaborating) best reflects their approach during the project. This was used to prompt discussion of conflict resolution strategies, and how conflict had been handled in their groups. The second activity involved providing positive feedback to each group member, describing what was appreciated during the project, in order to shift focus towards positive affirmation in the final stages of the project.

RESULTS AND EVALUATION

The group diversity activities were evaluated in four ways: a short evaluation in the final session; a final course evaluation; optional reflection essays from the students; and interviews conducted once the course finished. 29 of 31 students completed the short evaluation and 14 completed the final course evaluation. 16 students completed reflection essays. Five students volunteered for the interviews, all of whom were international students. Using primarily the reflection essays, themes were identified from the student comments which were then coded by the authors.

Student evaluation results

The results of the short evaluation were very positive, especially for the workshops. 68.9% of the students felt that the first workshop was very useful or useful and this increased to 72.4% for the second workshop. Only two students felt that the first workshop was not useful and none for the second. The introduction seminar was not as highly ranked (57.2% felt it was very useful or useful) and three felt that it was not very useful, seeming to indicate that it is the occasions where the students are active which they appreciate the most. In the final course evaluation, students ranked the group diversity activities with an average of 4.21 out of 5. This went down to 3.21 when it came to the individual group assessment activities (see comments on this further down in “reflections on peer group assessment”).

Reflection and interview results

From the interviews and reflection essays, the following themes were identified: attitudes to diversity; reflections on the group contract; reflections on the peer group assessment; the importance of communication and attitudes and roles within the group.

Attitudes to diversity

Students stated that they were positive to working in culturally diverse groups (cf Summers and Volet,2008) and saw the reasons behind it. In many cases, they appreciated the range of experience that the group brought with them and the learning experience this provided:
“Big diversity means a great variation in experience and knowledge, which has resulted in a fruitful project with very positive results. However, the road has not been straight and issues

that I usually take for granted, has in the project been re-defined from my perspective". (Swedish student)

In this case, the Swedish students on the course had had a lot of previous input and experience with group dynamics from their Bachelor program, but still needed extra support when it came to the culturally diverse groups. Another Swedish student commented:
"Diversity can be really great if it is handled in a correct way, if not, it can be disastrous instead".

Of course, diversity does not necessarily have to be in terms of cultural background. There can be also be diversity in terms of technical background, personality, motivation, amongst many other aspects. One issue that was seen as more challenging by some students than cultural differences were differences in the level of ambition of the students. One Asian student interviewed spoke of the frustration of aiming for high grades in group work because he was aiming for a scholarship, for example.

Reflections on the group contract

Many students commented that drafting the group contract was a useful process in terms of defining roles and dealing with conflict. One Swedish student commented that
" creating a group contract in the initial project stage is an important and fruitful assignment".

However, in the interviews, one Asian student commented that the group contract needs to be followed up on, since in his group, when there was conflict, they did not follow what was agreed in the contract.

Reflections on the peer group assessment

Many students commented that this process was the most useful of the group diversity activities, particularly the use of the assessment for ongoing feedback on their group. One European student commented after the first team assessment that:
"This was a very important milestone in the group and one of my biggest learning points of group dynamics. It became clear that some things were difficult to some of the group members".

They appreciated the opportunity to meet as a group and reflect on the feedback they had received and that the feedback given in the assessment was anonymous, which facilitated honesty. In many cases, this generated discussion about participation in the group and how to create a positive group atmosphere, through, for example, social activities. Some individuals commented on the fact that they were aware they dominated discussions, while others realised they were too quiet. The process of grading each other meant that they took it seriously. In some cases, they could see improvement. In the interview, for example, one Indian student commented on the fact that his punctuality improved during the course. Through the feedback and group discussion, he realised that this was more of an issue in Sweden than in his home country and made an effect to work with that aspect.

However, the assessment was also described as a "coin that has two face". Issues were that it was not always easy to set numerical values to some of the concepts, the timing of the assessment affected what was possible to grade, that it was difficult to compare from one assessment to the next because understanding of what the criteria meant changed; that there is the risk that groups postponed discussions of conflicts until the workshop; and that there were too many assessments.

The importance of communication

Communication was highlighted by many students as critical to a well-functioning group. Two key aspects were mentioned: the importance of openness in communication and being able to bring up issues in the group. The second aspect was the importance of using English. As regards the first point, in the interviews, one Asian student expressed it this way:
"*It's important that people can express themselves freely with no repercussions. Also to create a platform for people to criticise freely".*

This is a process that takes time. This particular student gave the example of another student in the group who had confided in him some of his frustrations with the group work, but did not dare to bring these issues up with the group as a whole, which he found a challenging and sensitive situation.

In the second aspect, that of using English, an Asian student in the interviews commented on the varying levels of English from different nationalities and that this could become a hindrance when it comes to group discussions.

Attitudes and roles within the group

Two aspects discussed in the reflective texts were the balance between work and socialising and the role that students took in the group. In terms of socializing, this was particularly appreciated by the international students. One Asian student commented:
"*The best part I believe is that we relax and have fun together. For example, having FIKA (Swedish word for coffee break) and going off topic for a short break TOGETHER"* (student's own capital letters, author's comment on fika).

In the interviews, one Asian student described Swedish working style as working hard from 8-5 but not longer. In comparison, he felt that the international students were willing to stay longer. This can be related to the social situation, in general, where the Swedish students are at home and possibly have more commitments outside the study environment.

In terms of roles, students fell into two groups, those who saw themselves as leaders and those who did not. We encouraged the students to consider their roles in the first seminar in both the group contract and the SWOT analysis. Some found that they needed to compromise on their role when there was, for example, another leader in the group.

CONCLUSION

A number of studies have shown that, in order to have well-functioning, culturally diverse groups, those groups need support. Leask (2009) comments that:

"*simply requiring home and international students to work together in groups on tasks, without adequate preparation or support, will not lead to meaningful and valued interaction between the two groups or support internationalisation of the curriculum*." (p.211)

This support can take place in a number of ways. This article has focused on activities that have been used for a number of years in group dynamics courses, for example, peer group assessment, group contracts, and SWOT analyses, and analysed their use in a culturally diverse project course.

Our key findings concern attitudes to diversity; communication; and students finding their own roles within the group. Cultural diversity means a greater variety of experience, knowledge and expectations, which can create affordances as well as frustrations. The challenge is to foster open communication, and mutual trust and respect between group members, which is the basis of a well-functioning group (Duhigg, 2016; Wheelan, 2014,). By creating a structure for this through a group contract and then continuous peer assessment, group members were given a forum to set expectations and express their feelings about the group anonymously.

However, this was by no means a perfect solution. Some student reflections still expressed frustration with uneven workloads and one interviewee reflected that students still tended to revert to their country groups when given the chance. Therefore, in order to achieve the goal of "fostering intercultural cooperation", there needs to be constructive alignment such that these issues are included as program and course goals; addressed throughout the program; and assessed accordingly.

Please note: Nationalities are given of students in the 2 major nationality groups of Sweden and India. Otherwise continents are given when there was only 1-2 of that nationality in the class to maintain anonymity

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BIOGRAPHICAL INFORMATION

Becky Bergman is a lecturer in technical communication at the Division for Language and Communication at Chalmers University of Technology. Her teaching at Chalmers involves communication courses for engineering students of all disciplines and levels, primarily electrical engineering and shipping programs at the undergraduate level and Master's level communication and writing courses. She also conducts workshops for faculty on issues concerning teaching in English and intercultural communication. Particular research interests are intercultural communication, integrated language and content teaching (ICL) and peer reviewing.

Anthony Norman is a lecturer at the Division for Language and Communication at Chalmers. He is involved with a range of courses, mostly involving communication courses integrated into technical courses at various levels. He has previously worked at the Chalmers Writing Centre while a student, and continues to be involved in the centre and the writing tutors. His research interests include peer reviewing, use of digital technology in the classroom, and various aspects of group dynamics and intercultural communication.

Carl Johan Carlsson is a senior lecturer at the Division for Language and Communication at Chalmers. He is involved in communication courses with a focus on technical communication and academic writing in several educational programmes, primarily within the fields of mechanical engineering, design engineering, and civil engineering. As the director of Chalmers Writing Centre, he is responsible for the development of writing centre pedagogy and the peer tutors working there. His research interest includes various aspects of writing and communication in higher education, intercultural communication, pedagogy and pedagogical development work.

Daniel Nåfors is a Ph.D. student at product and production development at Chalmers University of Technology in Sweden. It was at Chalmers where he completed both his Bachelor's degree in automation and mechatronics as well as his Master's degree in production engineering. He is researching a potential digitalization of layout planning in factories, teaching and administrating PPU171 Industry Project and also supervising Bachelor theses, Master theses and a course in production simulation.

Anders Skoogh, PhD, is an Associate Professor at the Department of Product and Production Development at Chalmers University of Technology. He is a research group leader for Production Service Systems & Maintenance. Anders is also the director of Chalmers' Master's program in Production Engineering and a board member of Sustainability Circle (www.sustainabilitycircle.se) with responsibilities for research collaboration. Before starting his research career, he accumulated industrial experience from being a logistics developer at Volvo Cars.

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