Assessing group-work projects in higher education: some pedagogical and ethical considerations

Link to publication record in USC Research Bank:
http://research.usc.edu.au/vital/access/manager/Repository/usc:11260

Document Version:
Author accepted manuscript (postprint)

Citation for published version:

Copyright Statement:
Copyright © 2006 Michael Christie and Fariba Ferdos. Reproduced with permission.
Assessing group-work projects in higher education: some pedagogical and ethical considerations

Michael Christie and Fariba Ferdos

Introduction

Over the last fifteen years a surprising number of books on teaching and learning in adult and higher education have been published. An alphabetical list of some of them include Abercrombie, 1980: Biggs and Moore, 1993; Biggs, 2003; Boud, and Feletti, 1997; Brockbank and McGill, 1998; Chalmers and Fuller, 1996; Gibbs, 1992; Laurillard, 1993; McKeachie, 2002; Ramsden, 1992 and Wiske (ed.), 1998. Many of them have very similar titles and all most all of them subscribe to a more student focused approach, where the student’s learning and how to facilitate it, is emphasised. Quite a number of the authors are also researchers. Most of them, especially those from Europe, the UK, Australia, Singapore and Hong Kong, come from a constructivist or phenomenographical tradition. The work of Ference Marton and his associates in Göteborg, Sweden, in the 1970s and 1980s established the importance of how students approach their learning. The concept of deep and surface approaches to learning and the ways that different types of teaching and assessment can encourage one or the other feature in many of the text books cited above. The research of Marton and his associates has been developed and diversified over the period we mention (see Marton and Booth, 1997; Marton, Hounsell, and Entwistle, N [eds], 1997; Prosser and Trigwell, 1998 and Bowden and Marton, 2000). In the USA Jack Mezirow and his associates (Mezirow, 1991) developed their theory of transformative learning which owes much to the work of critical theorists such as Habermas and radical thinkers like Paolo Friere. This theory underpins a number of adult education textbooks such as Brookfield’s The skilful teacher (1990) and Cranton’s Working with adult learners (1992). Theories of learning have also formed the basis for courses given in university centres for teaching and learning.

Of the various authors mentioned above, it was Biggs (2003), in his book entitled Teaching for quality learning in Higher Education, who most clearly emphasised the importance of constructively aligning course aims, teaching and learning methods and assessment procedures in the competitive context of university education. The logic behind this position is that students, for various reasons, are driven by assessment so why not use this driving force to develop assessment procedures that encourage a deeper approach to learning and a more meaningful understanding of the subject matter. Since 1990 the importance of assessment in higher education is manifested by an increase in
the number of books in this area. These books are not simply ‘how to do it’ manuals such as Norman Gronlund’s classic text *Assessment of student achievement*. They tend to put assessment in context and argue for more continuous and varied forms of assessment. Brown and Knight (1994) provide an overview of assessment procedures in Higher Education, Torrance (1994) edited a number of scholarly contributions on the subject of authentic assessment, Boud (1995) argues for increased self assessment, while George and Cowan (1999) focus on formative assessment. In some cases, attempts to implement variety and continuity in assessment have lead to large-scale curriculum initiatives such as competency based training (CBT) and problem based learning (PBL) and to more specific initiatives such as the Massachusetts University of Technology’s CDIO concept, where students are expected to conceive, design, implement and operate a machine or product as part of a group work process. CDIO, as an educational initiative, is best known in engineering education circles and could be classed as a form of problem based learning or authentic assessment.

**Methodology**

In this case study we were interested in finding out how teachers and students in an engineering university perceived the aims and the operation of group work, how they saw the role of leadership (including the design, implementation and evaluation of the group work) and what they considered were the advantages and disadvantages of group work. The university concerned, Chalmers University of Technology, is situated in Göteborg on the west coast of Sweden and over the last five years it has funded a number of pedagogical projects. This case study is part of one of three projects currently being carried out by the Chalmers Centre for Digital Media and Higher Education. The project is called ‘Engendering good learning in group work’. In the case study reported here we were particularly interested in pedagogical and ethical issues concerning assessment of group work. Because of this we focused on the constructive alignment of group work, on assessment procedures and on and the ‘backwash’ affect of assessment on learning in groups (see Biggs, 2003). We were also interested in quality assurance issues and any ideas teachers might have for the constant improvement of group work. Our theoretical position was a constructivist one and our research method qualitative. The data that we analysed came from three sources.

The first source was an email survey of six full and fourteen part time teachers who had some involvement with group work. The email survey was carried out by David Jaques who was employed as a consultant to run two workshops at Chalmers in March 2004, one for the full time teachers and one for a group of part time teachers. The latter were for the most part doctoral students who, in Sweden, are considered part of the faculty and are paid to teach for 20% of their contracted candidature. The duration of their PhD period is usually extended to 4-5 years to allow for this. Many of these part time teachers are used as teaching assistants, tutors and laboratory supervisors as well as acting as leaders and mentors for group work projects. They assist, for example in running group project work in chemical engineering and in a CDIO programme for first year mechanical engineering students. The questions in the survey were:
• For what aims and purposes do you use groups?
• What part do they play in the course as a whole?
• What skills, values and other outcomes do you want students to pick up in groups?
• Which aspects of group leadership do you most frequently find tricky?
• Which aspect of participation do students seem to have greatest difficulties with?
• With which types of student or groups of student do you personally find it most challenging to work with?
• Do you have any idea what the students might say that they find difficult or problematical either in tutored groups or project groups?
• What particular values or behaviours among students seem to conflict with their achievement or the achievement of others?
• What role does assessment play in groups you are responsible for?

Respondents were also invited to nominate issues that they would like to cover in the two workshops. Their suggestions included evaluating group work, monitoring individual contributions and peer assessment. Quotations from respondents are identified by the initials FT (full time) or PT (part time) followed by a number that corresponds to the order of response to each question. Because the responses were combined into a single document and not all respondents answered all questions a coded response (FT1 for example) does not necessarily correspond to a particular person.

The second source of data came from two sets of focus groups composed of teaching staff who took part in an introductory pedagogical course that is held once a semester. These courses are obligatory for doctoral students (part time teachers) and strongly recommended for full time staff. The latter are aware that their promotion or chances of obtaining other jobs in higher education partly depend on proof of pedagogical merits, including courses on how to teach and supervise better. The average number of participants in these courses is twenty and the focus groups we organised were composed of 5-6 participants. The focus groups were held in the autumn term 2004 and involved 16 full time teachers and 20 part time teachers (doctoral students). In the doctoral course the focus groups were selected randomly whereas in the full time teachers’ course, where the percentage of women was 25%, the groups were divided into three male and one female group. The participants were asked if we could use the results in a small action research study on group work, the results of which would be presented at a conference and/or used to improve that section of the pedagogical course that deals with the theory and practice of group work. The focus groups were given four simple questions to discuss and their discussion was not monitored by the researchers. The data we gathered came from the plenary discussions that followed the focus group work. The questions the focus groups were asked to discuss were:

• Why do you use groups?
• What sort of groups are you usually involved with?
• What difficulties have you encountered in using group work?
• How do you think you can improve learning in groups?
• Is gender an issue in group work?
• Are there any other key issues in the use of group work?

The third source of data came from interviews with a sample of 23 students involved in a second year electrical engineering course on semiconductors. In total 285 (39 female and 246 male students) were registered for the course. We conducted informal interviews with the teacher of the course and a sample of 23 course participants of whom 9 were female and 14 male. The interviews took place after the course was concluded (late 2003 and early 2004). Our sample group included a higher proportion of women than in the course itself where the percentage of women is 10.3% because. This was because one of the authors intended using the data we obtained for a paper on gender issues in group work as well as a basis for the current paper. Some of conclusions and the quoted material that support them have already appeared in this publication (Ferdos, 2004).

The group work in which the students participated made up 30% of a course called ‘Semiconductor Devices’ which runs throughout the second part of the first semester at Chalmers. Students were required to work in groups of four on a three part project where each part corresponded to a key element in the course. The project was compulsory and the teacher’s intention was that the students should work together not only to gain a deeper understanding of the subject matter but also to learn more generic skills such as good communication, gender awareness, online problem solving, team work and shared responsibility for specific tasks. The actual job was to solve problems related to p-n junctions, diodes and transistors using online measuring devices. The students were instructed to work as a team on background research and on the problem solving exercises which required them to carry out online measurements, analyse the data they obtained and present the results in written and oral form. The group-work was done without any dedicated supervision but the responsible teacher and other tutors were available to give advice. Group work was graded as either pass or fail whereas the final exam, largely based on work done during groups, was graded fail, pass, credit and distinction. The only requirement regarding group formation was that the number in each group should be four. In most cases students formed groups with friends with whom they had already worked with in the first term.

We chose our informants from four evenly mixed groups, three all male groups, and one all female group. At least one man and one woman was chosen from the mixed groups. Questions in the semi-structured interviews included:

• How did you work together as a group?
• How did you learn?
• Do you think all of you learned in the same way?
• What did you do when having problems with the assignment?
• Who did what?
• Who worked most with the computer?
• Who had new ideas?
• Who explained what for others?
• What was the most important thing you learned?
Was something special happening in the group when you learned particularly well?

Results from the survey

Most of the teachers who responded to the Jaques survey identified group work aims that are found readily in the literature. One of the full time teachers (FT2) said, for instance, that ‘The aim (of groups) is to increase understanding through active participation and critical thinking’. Another (FT4) noted that ‘There are several reasons’ for using groups ‘where the least pedagogical aspect is a lessened workload in terms of marking etc. However, more interesting factors are, of course, the concept of learning to work in a group/project, the reciprocity of knowledge – the group as a platform for cognitive discourse’. The teachers we surveyed referred to different types of group work. The most common forms of group work in the early years at Chalmers were small group laboratory work (often pairs) and tutorials. One of the part time teachers (PT11) explained: The students work in groups with exercises which are supposed to be a complement to the lectures in large classes. In the groups the students get experience solving problems and hopefully also discussing the theory with each other, while being helped and encouraged by a teacher…’. The same teacher summed up the aim of group work by saying: ‘I want the students to learn how to work with other people as a group, ask questions when they don’t know something, learn from each other, and show respect towards each other’. Some of the teachers noted that they used groups for practical reasons (saving on time, space and equipment in laboratory work for example) while PT4 obviously saw them as a chance to expand the student’s abilities via: ‘Brainstorming, creating ideas, exchanging information, project work; enhancing and facilitating learning; achievement of good cooperative skills’.

Most of the teachers gave sophisticated answers to the question ‘What skills, values and other outcomes do you want students to pick up in groups?’. Their responses covered generic as well as specific skills and in some cases extended what we found in the literature. One of the part time teachers (PT1) summarized many of the other teachers’ responses with the following list: ‘Discussion skills, cooperation, peer response, group dynamics skills, social competence’. A full time teacher (FT4) added to this list with: ‘Communication, some kind of leadership, management, to be aware of and to solve group conflicts, explaining complicated things to others’. The last point is particularly significant when seen in relation to responses from students who took part in the electrical engineering group work (see results section below).

In regard to the questions about leading groups and dealing with difficulties in groupwork one of the part time teachers (PT2) summed up many other replies by saying that a major challenge was: ‘Getting group members active and motivated to take on the task at hand’. Another part time teacher, PT8, said: ‘All of my groups have their own challenge, one because they are really good students and I feel I would like them to learn more than just the basics, another because they have trouble focusing on learning, a third because some of the group members seem to mess it up for the others by being unable to focus on the task while the others try to work. I find all of this challenging, so the challenge is really
to get every group to perform optimally and not make any individual suffer because he happened to end up in a bad group’. Raising the students’ level of motivation was seen as a major leadership challenge. FT4 said: ‘I found it hard to work with students who are not so motivated to do their best’ and respondents FT2, PT2, PT3 and PT9 agreed.

There were other types of students who caused problems for some of the teachers we surveyed. A part time teacher (PT12) spoke about ‘Students who do not appreciate my comments on their work and only wants to know if it is enough to pass the course’. Others noted that at Chalmers one had to deal with group practices that are developed during high school and which carry over to university. In particular the habit of dividing up the group work into individual tasks in order to carry out tasks more efficiently mitigated against generic aims for group work such as communication skills, team work and social competence. One of the full time teachers (FT1) talked about a variation on this theme: ‘Apart from working with the “wrong” person I believe students sometimes have problems with division of the work. Sometimes they manage to divide the work in between them, in which case some students cover for others by having to pull a greater workload. In other cases they seem reluctant to divide the task at all and tend to try to do everything together - e.g. sitting 5 persons in front of one computer screen when writing a report’.

One of the main problems for PT12 was: ‘To make all in the group work together. Often the “fast ones” doesn’t (sic) want to stay and help the ones that are a bit slower. Some students just do nothing in the group and it’s hard to make them work’. Another teacher (PT4) had a similar problem: ‘I think in project groups there can be problems if not all group members are willing to put the same effort into the task. There might be someone who tries to get along without doing his share, which could be difficult to deal with for the other group members’. This ‘might lead’ according to (PT5), ‘to some serious conflicts’. The same teacher made an important point, one that we return to in our discussion section. ‘It is important’, PT5 argued, ‘to make clear task definitions and divisions among group members. However, this may not work so well in reality. I don’t have a good solution but one way is to try to meet frequently and report how much has been done. It is important that group members would discuss all relevant issues and find out whether there are any difficulties so all could help’. In general the respondents felt that the main problems in group work involved an equal distribution of the workload, differences in intellectual and other abilities between group members, differences in levels of motivation and ambition, and problems in striking a balance between mentoring and monitoring the group on the one hand and leaving them to work independently on the other. The teachers were very honest in confronting these difficulties. FT1 said: ‘I believe I try to make each student responsible for the whole group in that they are expected to be able to give details about the final result, even though someone else may have contributed that piece to the puzzle’.

The same teacher made an interesting comment that touched on our question regarding assessment. We wanted to know ‘What role does assessment play in groups you are responsible for?’ In a reflective comment on achieving some of the aims of group work FT1 said ‘Being self-critical I recognise that I, to a greater extent, could try to encourage students to reflect more on the group’s working process itself by making this
part of the assessment (something I intend to try in the future). I also believe that my grading system of just pass/fail may influence results in that students who are only working towards a grade may develop a “good enough” attitude while others, intrinsically motivated, want to go on’. Many other respondents agreed that assessment was essential in directing students to cooperate and carry out the objectives of group work. The issue of grading group work was a major theme among the responses. One of the full time teachers, PT4, concurred with FT1 and a number of other respondents regarding assessment of group projects at Chalmers: ‘During projects the assessment only includes passing or not passing the project. So that assessment only means that I decide whether the students have gained the “lowest” level of understanding or not. What I mean is that they are not credited if they know more than what is “enough”. FT3 felt that assessment ‘is often the focal point in any project. However, assessment in terms of feedback for reflection and analysis of the process and its outcome is more interesting than a verdict’. FT5, who used a graded system, said ‘I do not think most students think so much about the grade during the project work but only in the end. Some students do not think the grades are fare (sic). Personally I find it hard to judge the students’. PT6 believed that: ‘Assessment may help to understand the status of the work being done, and often helps to improve or adjust the work if it is not in the right direction’.

One of the most thought provoking of the answers came from FT4 who summed up the effect of assessment on group work with one word: ‘Destructive’. We will return to this in our discussion but many adult educators, particularly in Sweden, would agree that graded, competitive assessment often gets in the way of meaningful learning. This position was nicely summarised in the answer given by PT11: ‘There is no assessment in the groups. They are used only for learning purposes’. Since most of the teachers operated in a competitive system, however, they agreed that assessment was a key factor in engendering good group work. They agreed with FT1 who stressed the importance of ‘spreading out deadlines to get (some) continuous feedback of what the students actually grasp and how they interpret what I expect’. This teacher said: ‘I try to make each student responsible for the whole group in that they are expected to be able to give details about details of the final result, even though someone else may have contributed that piece to the puzzle’. Getting students to cooperate in this manner in competitive situations is one of the biggest challenges in designing and implementing assessment procedures for group work projects. This is even more difficult today when the student body is no longer as homogeneous as it used to be.

Results from the focus groups

Data obtained from the plenary sessions that followed the focus groups backed up many of the findings from the survey. The consensus was that the use of groups was mainly traditional in the early years of Chalmers education. Group work was used for problem solving sessions related to lecture and textbook material and in laboratory work. Most of the part time teachers were involved with tutorial and laboratory groups although 5% of them also acted as teaching assistants and leaders in group-work projects. Not all of the full-time teachers used group work but there was an overall agreement that the advantage
of group work was that it could promote both generic and specific capabilities. The capabilities that were specified replicate many of those cited above.

The focus groups also reported on similar problems and difficulties that they encountered in using group work. They mentioned unmotivated and lazy students, students who focused on product rather than process, shy students who had difficulty asserting themselves and students who had a tendency to dominate groups. They also referred to increasing differences in the levels of knowledge and abilities among group members. This tended to cause some of the frustrations mentioned above. Our informants also noted that the use of group work, apart from tutorials and lab work, increased in the latter years of a programme. They pointed out that economic factors often lay behind this. Teachers felt that they were not sufficiently rewarded by the system to take the time and effort to change their curriculum to include more group work. They argued that the university prioritised research, and that practical benefits such as promotion were tied to research rather than innovative teaching methods. Because of this many teachers, especially those in the early years of a programme where there were large cohorts of students, were reluctant to abandon the traditional lecture, exercise, lab and final exam format. They perceived that the more innovative types of pedagogy such as PBL, CDIO or other initiatives which relied heavily on group work took more effort, time and departmental resources.

In response to the question on how one can improve learning in groups most of them stressed the need for aligning the aims, methods and assessment procedures used in the group work. This was not an unexpected response since the textbook they used for their pedagogical course was Bigg’s *Teaching for quality learning in Higher Education* and the need for the constructive alignment of the curriculum is a central argument in it. What was very surprising was that in response to the question ‘Is gender an issue in group work?’ most of the focus groups responded negatively. Even the all female group from among the cohort of full-time teachers did not feel that women were discriminated against in group work at Chalmers. This was so even though women are a minority in most group work at Chalmers, as they were in fact in the pedagogical course they were taking. This result is in line with a survey undertaken at Chalmers by Göransson a decade earlier (Göransson 1995).

The final question put to the focus groups invited them to suggest ‘any other key issues in the use of group work’. The full-time teachers identified the need for university leadership and increased resources and incentives for group work as a key issue. Without it, they argued, group work would tend to occur at the masters level and during the latter years of undergraduate education. Ethical issues were also highlighted, including issues regarding copying and plagiarism. This was especially the case with group work that demanded individual contributions. A corollary to this was how to design fair methods for assessing such contributions. The part-time teachers also stressed the need for more careful design of group work and clearer instructions regarding how the work should be carried out. They saw a need for defined roles for group members if the problems mentioned above were to be obviated. Since they were often the ones that students came to when aims, instructions, tasks and assessment were unclear they felt that the teacher
responsible should have a clear design for the group work and communicate it to the students.

Results from the case study

The results from the interviews we carried out with our sample of group-work students in electrical engineering revealed a number of interesting similarities and differences with the above data. Much of what the students said in response to the question ‘How did you work together as a group?’ confirmed responses from the survey and focus groups. The students, for instance, acknowledged the practice of dividing the task in the interests of efficiently solving the set problems. Although it was a form of teamwork it tended to subvert the close collaboration that the teacher had hoped would be developed by the group. The teacher intended that all members of the group should share the work involved in order to get a chance to solve problems online, discuss and evaluate possible solutions, research background information and collectively write up and present the results. This did not happen, as the earlier study by one of the authors showed (Faribos, 2004). In the groups it was the more knowledgeable or assertive males who did the problem solving online. In most cases they had the apparent approval of the group. This same group of ‘alpha males’ also tended to research and explain solutions to the others in the group. The more pedestrian task of collating results and writing them up in a report was left to others. In three out of the four mixed groups the writing of the report was done by female students. One of them (FS8) said: ‘Some of us did the writing...It was one of the boys who did the measuring’. Another female informant (FS3) said ‘The boys did the measuring and calculations and did the diagrams; we (girls) did the writing’. When she was asked about how they decided this arrangement she replied: ‘I don’t know really, it just turned out so’.

In another part of her interview the same student (FS3) provides a possible explanation for why the boys did the hands-on problem-solving while the girls did the reporting. Self confidence seems to have played an important part. FS3 said: ‘I didn’t want to work with the computer, I’m not good at it and then it takes a lot of time, it is embarrassing...’. The boys on the other hand were not so modest. A male student, (MS10) who did not belong to the same group, commented: ‘I actually did all the calculations and solved all the problems in the project...I believe that the girls did the report writing while we found out the solutions...’. Another male student (MS11) said: ‘I was best in the group, so often it was me who read and understood the subject and then explained it to the others...’.

When we asked about task distribution and the individual student’s method of learning things our informants were, in general, satisfied with both. However, when we compared results for the final exam, which contained questions based on the group work, the comparative pass rate between the male and female students was disturbing. As we noted in the earlier paper by Ferdos (2004) a dismal 92% of the female students failed at the final exam compared to a 60% failure rate among the male students. In Sweden it is possible to retake exams so the eventual pass and fail rates were better with about 40% of the 39 female students and 60% of the 246 male students passing. When we interviewed the teacher he expressed disappointment with the result, especially since he had been motivated by pedagogical reasons to introduce more group work. He admitted that the
design of the group work needed to be improved and that the poor results for women students was particularly worrying.

What was surprising for us was that female students chose to be silent during the discussion because they perceived that they learned better by listening. FS5 said: 'It is much easier for me to get the subject in discussions. By hearing other people explain it...' while another student, FS4, said: 'I am not that kind of person who explains for other people. I just don’t have this kind of requirement. I read on and on until I understand or I ask other people to explain it...'. Another of the women students (FS3) said: 'I am the kind who listens. It is how I learn. One of the male students) explained for me and I listened...'. This sentiment was echoed by FS6 who referred to a male student, whom she said, ‘could talk and explain much more easily. I have to think properly before I say something so that it sounds sensible you know...’. The males on the other hand had a different perspective, one that coincides with learning theories that argue that we learn best by doing. One of the males (MS6) said: 'I learn by expressing myself, when I talk about something and then when I think about this alone’. Other male students expressed similar sentiments. MS7 said: ‘I learn by talking about things, and by putting them into practice. Who cares about a p-n junction before you can see the relevance in relation to other things?’ while MS8 said: ‘When I can explain something I know that I have understood it. You get better and deeper understanding of the subject by talking about it and by playing with it and practising it...’. Another male student (MS5) made an almost identical response: ‘I learn about the subject when I describe it to others, so I start a discussion about the subject and try to explain the nature of it, then you can hear from others if you are wrong, otherwise you get some confirmation. I mean you share the knowledge and it circulates...’.

Although both men and women commented on the effectiveness of group discussion it was the women who were the more enthusiastic about it. They also felt responsible for the smooth running of the group. For example, female informants spoke of the importance of contributing to group and working steadily so that things were not left to the last minute. The women, according to our interviews, took greater social responsibility for the group and came better prepared to group discussions. Five out of the nine women that we spoke to said it was important to be well prepared for group meetings whereas males did not emphasise this to the same extent. Despite being prepared many of the women remained silent during group discussions. In contrast to one of the female respondents (FS2) who said: ‘I learned how to learn; it was so much better when you had studied the book before you began working. You had to do this you know, before meetings, I mean you are expected to do so...’ one of the male respondents (MS7) said: ‘I didn’t read before meetings, I learned when we discussed things...I read by myself later if it was something I didn’t understand...’. And yet despite their preparation the female students were less actively involved in the group discussions, apart, of course, from those groups that consisted solely of female students. The contribution of female students in mixed groups consisted mostly of listening to explanations and asking short questions but rarely describing or answering questions. Only one female informant (FS7) believed that she learned better when actively involved: ‘You can tell that you understand the subject when you can explain it to others. When you are explaining the matter you
can hear if something is not right, that you haven’t really understood it as you thought’. Despite this belief when she was asked if she did a lot of explaining during the group work she said: ‘No, I did not. It was one of the boys who did it. He was better in the subject and explained it to us’.

Why women took a more passive role is hard to pin down. From their own statements one could conclude they did not really believe in their capabilities. This conclusion fits in with the literature including the seminal work, Women’s ways of knowing by Belenky and her co-authors The problem, judging by the exam results, is that their passivity affected the depth of their understanding. The more the student takes part in the collective enterprise that defines group work, the more he or she will get out of it. This means, if our case study is to be taken as evidence, that the participation must be active rather than passive and that individuals in the group need to have a chance to do all the tasks. Although our informants stated that the distribution of work within the group was not done consciously the fact is that men got to do the higher order cognitive tasks while the women ended up putting a lot of effort into lower order tasks such as collecting results and reporting on them.

Discussion and conclusions

All three sources of data confirmed the belief that the aim of group work is to develop generic as well as specific skills. The teachers emphasised that there are different reasons for doing group work and that in the early years these are often practical. Laboratory pair work and tutorial groups tend to focus on subject related knowledge and skills and are less complex to design and run. Group work projects such as those used in CDIO and PBL curricula are meant to develop generic as well as specific capabilities and are more demanding in terms of design and implementation. It is one thing to say that such group work will develop certain generic capabilities. It is an entirely different manner to engender and test those capabilities. There was almost no discussion among our informants on how capabilities such as social competence or team work would be tested and it was assumed, judging from the focus group plenary sessions that communication skills would be judged mainly by the written and verbal reports that were usually demanded at the end of a group project. Nor was there any real discussion about the ethical questions of socially engineering a group so that particular capabilities would be enhanced. For example, there was little talk about designing groups in such a way that each individual was forced, by assessment criteria, to take turns in various roles – the role of leader and/or chairperson, scribe, researcher, hands-on problem solver, observer, explainer and report writer or presenter. One of our conclusions is that the rotation of roles needs to be part of the design of group work but that it is ethically important to make this clear to all participants from the beginning and to make allowances for individuals who for whatever reason (shyness, disabilities) might have a problem in taking on all the roles.

In terms of generic capabilities it surprised us that none of our informants highlighted the development of gender awareness as a key competency. When we specifically asked the focus groups to discuss this issue there was consensus that gender did not play a big role
in group work at Chalmers. This perception was similar to that found in earlier research carried out at Chalmers (Ferdos, 2004 and Göransson, 1995). The teachers and students we worked with did not think that stereotyping of gender roles, discrimination on the basis of gender, or gender in general was an important issue in group design or implementation. We believe there are reasons for this, reasons that are embedded in earlier educational experiences. Women and girls who are interested in the hard sciences often form a minority in these subjects in the last years of high school and the early years of university. Attitudes to groups and ways of behaving in them are established at this time and it is not uncommon for self selected groups to continue on with the same members during their early university education.

This was confirmed by responses from our survey, focus groups and case study. Since men are in a majority at Chalmers it tends to be their attitudes and actions that become the group norm. According to our research this norm is characterised by an emphasis on group tasks and the grades that are attached to them. The male norm values group efficiency and undervalues the social benefits of group work. The group is a means to an end rather than an end in itself. If the tasks can be done more efficiently by a division of labour then the group is often fragmented and individuals expected to get on with their particular part, often alone. This was a tendency noted by some of the teachers that were surveyed. One teacher (PT10) complained about ‘Utilitarian students, for whom ‘process’ and ‘meta perspective’ are only obstacles on the way towards the tangible artifact’. This type of utilitarianism is at odds with comments by female respondents in the Ferdos case study. These female students emphasised the importance of talking things through. They also valued social aspects of the group but nevertheless went along with the ‘let’s get the job done’ ideology of the male members. None of women in the study complained about this even though they preferred a looser, more communicative style of interaction whereas the male students we interviewed preferred the early establishment of a hierarchy within the group, again in the interest of efficiency.

Both male and female group members appear to be affected by the type of graded assessment used to judge individual and teamwork contributions to the group. If the graded assessment encourages a surface approach to learning or allows for pseudo group behaviour then both sexes are duly influenced. However since it is men who, for the most part, take the lead in organising the group it is often their will that steers decisions regarding surface or deep approaches to group work learning. As Biggs (2003) indicates, the choice of a surface approach to learning is often a very practical response to the type of assessment that is used. In a competitive setting where time is short, course demands high and summative assessment common it is often the surface approach that wins out in the group work section of a course. This is a fairly intelligent response especially if the final examination suits such surface learning. The onus then is on the teacher to design group work that encourages deep rather than surface approaches to learning. The option we mentioned earlier – doing away with assessment for group work – does not, unfortunately, seem to work in an educational system based on competitive grading.

In the electrical engineering course the men did better than the women in the final exam, an exam based on knowledge and skills that should have been acquired during group
work. There could be many reasons for this but we argue that one of them was that it was usually male group members who did most of the computing and explained what they knew to others. Their style of learning gave them more chance of success. The women on the other hand said they preferred a more communicative approach to learning. Had communication skills been part of the assessment more women might have passed the course. This raises ethical questions about the fairness of the test and the design of the group work. We conclude that better designed and more closely monitored group work would ensure that women had a better chance, given the prevailing norm, of being more actively involved in problem solving and in explaining the knowledge they acquire to others in the group. The male students on the other hand would be required to listen more and practise skills such as constructive feedback. In this way generic capabilities such as effective communication and gender awareness would be enhanced and all members of the group would have the opportunity to engage actively with higher-order, subject-specific skills and knowledge. Assessment, we argue, not only influences the quality of learning in groups but can also steer or re-enforce group norms that may undermine the espoused aims of small group and project work. Individuals are put usually together in groups to enhance generic as well as specific competencies. Some of these generic competencies include better communication skills, teamwork, gender and multicultural awareness and social skills. Failing to design group work where assessment measures the development of generic skills may damage rather than enhance those capabilities. Gender awareness is an example of this. Group norms can act as a default mechanism when group-work designers fail to devise proper assessment procedures. This is a question of pedagogy. To what extent, however, should educators design group work in technical universities to counteract the negative impact of group-work norms on minority members of the group? This is a question of ethics.

References