Using consultation in student groups to improve development of team work skills amongst more reluctant students.

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INTRODUCTION

Since Aalborg University (AAU) was founded it has been using an educational model, where Problem Based Learning is the turning point. Each semester the students work in groups using half of the study time to solve and document a real-world engineering problem.

Working with problems gives the students a very deep learning of the subjects they study and also very good problem solving skills and team work competencies both highly appreciated by the Danish companies. An important aspect of the first semester of the education is a course where the students get tools and tricks for good communication, collaboration, learning and project management (CLP).

This course has proven very helpful for most of the engineering students but students from some educations are more reluctant to follow the course and do the exercises than other. Students studying Bachelor in IT (BAIT) has for two years showed less interest in the course than e.g. Software and Computer Science students. The consequences of this are that app. 1/3 of the BAIT students don't develop their team work skills and competences to the level that is expected.

The development of team work skills is closely connected to how the theory and methods presented in the CLP course is used in the projects. The idea of combining exercises in the course with the use of theory and methods in the project was introduced in 2014: The teams hand in written answers to the exercises and The lecturer visit each team as a consultant two weeks later discussing the answers with the team members, enhancing their reflections on the experiences gained by using the methods in the project work.

This paper describes the setup of the course and the consultation and analyses the effects of the change by comparing the two cohorts of Bait students from 2013 and 2014.

1 BACKGROUND

The author has been part of the Aalborg experiment for many years starting as a student forty years ago and from 1980 employed as Assistant Professor and later Associate Professor with both teaching and research obligations. I believe that a study model such as the Aalborg experiment is dynamic and always changing through a process of continuous experiments with teaching and learning methods. The outcome of each experiment is assessed; identifying strength and weaknesses to plan the next step in the route of continues improvements.

Since 1999 I have researched in the area of how the students develop team work skills. The research is carried out as action research, as I am developing and teaching the problem-based and project-organized study and at the same time collecting data documenting the outcome of my experiments.

## 1.1 Experiences with first year students

From the practice in Aalborg it is know that freshmen students working in groups often find it difficult to collaborate and to use their full learning potential from being a team. Typical problems they are facing:

- They have different experiences with team work.
- They have none or very little experience in project management of large projects.
- They have different ambitions and different ideas about the content of the project.
- They have no experience with teachers facilitating project work.
- They do not know how to handle a conflict between group members.
- They are not aware of the power of learning together (Peer learning).

It seems obvious that teambuilding and help to develop team work competences could be very useful for the new teams. This was documented by Professor Kolmos in 1999 [1]. To improve the potential of project work a special course is offered to help the students develop their skills in cooperation, learning and project management (CLP).

1.2 Theory and methods

The theory behind the way team building and group dynamics is introduced in the CLP-course is best explained by introducing a special version of Kolb's learning circle [2] with extra words (in italics) paraphrased by the author in *Fig. 1.* Kolb's learning cycle describes how people learn either from their own experience or from abstract theories. Kolb calls this the perception dimension of learning. The knowledge can then be transformed trough a reflective process or through carrying out experiments. This is the transformation dimension of learning.
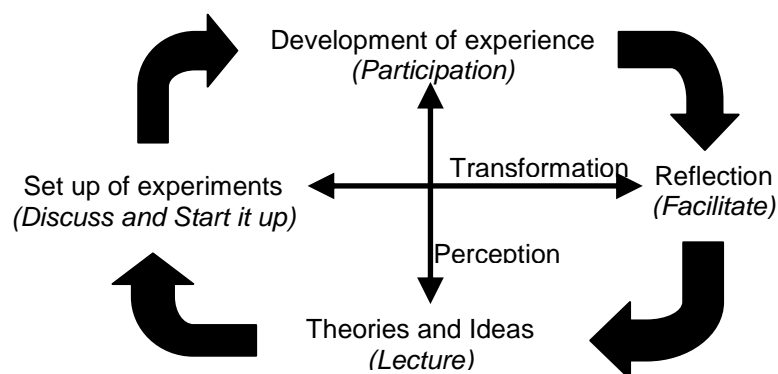
Fig. 1. Kolb's learning cycle [2]. The authors paraphrase the words in italics.

This model is used to explain how a CLP-teacher can help the students through respectively the perception and transformation dimensions when learning. According to the model the teacher can take initiative to create a learning environment based on experiments and reflections. The teacher may give a lecture with inputs and ideas on, how to improve practice within the group work. To follow up he/she can help the students prepare experiments to carry out during their project work in their group before the next course session. During the next session the teacher can facilitate reflection by asking reflexive questions about the experience gained by the students. Letting the students experiment and reflect the teacher not only guide the students round the Kolb learning cycle but also demonstrate that this is a fruitful way to develop both project work and group dynamics.

1.3 Outline of the first semester and the CLP course

When students enter the University they have only limited experience with project work that exceeds 1 ECTS. To give them some experiences they start doing a pilot project (P0 equals 5 ECTS) the first month of their study. They have half the study time to do the project and in the rest of the time they follow courses e.g. the CLP-course. The first lesson in CLP introduces the course and study form and explains that the P0-project is a trial and error approach where it is left to the students to do a project almost on their own and to document it in a 20 pages written report. The only help they get is the introduction lesson and 2-3 meetings with a supervisor to discuss the project they have chosen and its progress.

When they have finished the project and documented the work in a written report the CLP-course callsfor a reflection seminar where the students discuss the lessons learnt in terms of cooperation, project management and learning. The discussions are done in groups of 8 students representing at least four different P0 groups so different experiences is available for the reflection making it possible to synthesize ideas for improvements.

After the seminar the students returnto their own group and write a process analysis reflecting what happened in their group and how to improve the performance in the next project. The succeeding P0 examination is a reflective evaluation, starting with an oral defence by the students (½ hour) of both the project report and the process analysis where both issues are assessed afterwards.

The rest of the first semester the students is working with their first larger project (P1)that equals 10 ECTS stretched over 2½ month with half of their time available for the project.They form new groups and choose projects themselves within a given theme. Having done some mistakes in P0 the students have realized the necessity of experimenting and reflecting but also listening to good advises. Most of them now want to try out the tools presented in the CLP-course.

The content of the lessons given in P1 is:

• Cooperation, Supervision and Communication in and from the group
• Learning styles and project management
• Creativity
• Presentation and documentation skills
• Preparation of the process analysis

The last task in the first semester for the CLP-teacher is to read the process analysis and make a written comment with some reflexive questions to be used by both students and examiner at the P1 examination where both the project report and the process analysis are assessed. As for the P0 exam the students prepares an oral defence (1 hour) starting the exam.After the presentation the student groupare

assessed for three hours and marked individually based on their answers to the exam questions. Each student is questioned in different subjects from the project report and the process analysis to investigate how well they have fulfilled the learning goals.

1.4 Focus for this paper

This paper will focus on investigating the outcome of the CLP-course on what we consider to be the most important topics from the course in terms of improving the students' team work skills:

- Cooperation establishing common rules for the team
- Roles and functions in the team
- Conflicts and conflict handling
- Project management

These topics are covered by the first two lessons in the list from section 1.3.

2 CLP COURSE FOR BACHELOR IN IT STUDENTS

The Bachelor (BSc) education in IT (BAIT) is focused on communication at all levels both inside and outside organizations and companies. The education prepares the students for a career in digital business, new media and software development. Business; Communication and Business Development are the three key elements of the education.

2.1 Experiences from previous years

Compared to most of the other IT educations e.g. Software Engineering and Computer Science the BAIT students have been less enthusiastic in participating in the course activities. A typical scenario after two to three lessons would be that less than half the students was presents, so that most of the groups had 2-3 representatives and some none but also a few enthusiastic groups showing up all members. Unfortunately the none or less participating groups was not developing their team work skills to an acceptable level resulting in some very poor process analysis compared to Software Engineering and Computer science.

This situation is not desirable. Not only is more students failing the CLP course but the students also risk narrowing their learning potential if they can't get the groups to function and perform well because sharing of knowledge (Peer learning) is by far the most valuable learning resource in the Aalborg educational model.

2.2 Possible explanations for the identified problems

Why do BAIT students perform different than other IT students? We have not been able to identify one outstanding reason for that but there is several differences compared to the other IT educations that might influence the picture:

- Although IT is a very important part of the education it is focused much more on using IT in a Business Development and implementation perspective than on more engineering solutions.
- The students have a more diverse educational background than IT Engineering students and their interest is attracted to other areas of science.
- The teachers supervising and facilitation the groups have different educational backgrounds and are generally less experienced than on the other IT Educations.

These points might be an important part of explaining why BAIT students' react different from engineering IT students but they are not changeable. What is realistic and possible if we want to improve the BAIT student's development of teamwork skills is to make changes in the set up and implementation of the CLP course.

2.3 Searching for improvements

At the end of the first semester the students assesses all the courses and the projects. Based on written assessments from each team a meeting is held where the coordinator of the semester together with one representative from each team discuss what to write in the semester report with focus on suggestions and needs for changes. The students were generally satisfied with the semester project and all the courses and the only suggestion for improvement in the CLP course was that more students should show up since it was usable for all students.

Suggesting next year's students to show up at the course is probably not a very efficient advice so a meeting with all supervisors; the co-ordinator of the semester and the lecturer of the CLP course were held to identify improvement that might be beneficial for the next year's students. Since the students who showed up were generally rather satisfied with the content and run of the CLP course no direct changes was suggested but it was discussed how to "force" the students both to show up and to actively use the methods from the course in their daily teamwork.

The semester co-ordinator suggested to pick the two most important lessons for development of teamwork skills (see 1.4) and make it mandatory for each team to hand in a written answer to the exercises in these two lessons as a prerequisite to be able to attend the course exam. This might push the students to participate in these two lessons but we also wanted them to use the methods in their daily work and to continue following the rest of the course.

To solve this the lecturer suggested to combinethe exercises with the use of theory and methods in the project reading the written answers to the exercises handed in by each team and then visit each team two weeks later not only to discuss the answers with the team members but also enhance their reflections on the experiences gained by using the methods in the project work by asking reflexive questions to their experiences using the methods for some weeks.

These changes were implemented in the autumn of 2014 scheduling a half hour consulting meeting for each group.

3   RESULTS

The effect of the changes in the CLP course from 2013 to 2014 is analysed by comparing the written Process Analysis at the end of each semester documenting the student teams' use and development of team work competencies and the results from the individual written exam of the course.

The number of students attending the course was recorded and showed an average of 80 to 90 % of the students showing up for each lesson in 2014 compared to less than 50% attending the last three lessons in 2013.

3.1 Process Analysis 2013 versus 2014

As mentioned in section 1.3 the lecturer comments each of the team's process analysis in writing. There are no official marking of the process analysis because the

focus of the commenting is to give feedback to the students with questions that might help them to reflect once more or deeper on specific aspects in the analysis.

To be able to see if there are changes in the level of the process analysis from year to year the author mark them anyhow using the Danish marking scale except for the very top and bottom mark. These unofficial marks were given when I was reading the process analysis and didn't have plans yet to write a paper about the experiment so I consider them unbiased of the investigation and useful to compare the two versions of process analysis.

Table 1. Unofficial marks of Process analysis from 2013 (8) and 2014 (7)

Mark	Designation	Eu Scale	2013	2014
10	Very good	B	12,5 %	0 %
7	Good	C	0 %	57 %
4	Fair	D	12,5 %	43 %
02	Adequate	E	37,5 %	0 %
00	Inadequate	Fx	37,5 %	0 %

The results in *Table 1.*showsignificant differences between the two years with only two of the Process analysis being Fair or better in 2013 all 7 is Fair or Good in 2014. The quality of the documentation of team work skills and the team's ability to reflect on their experiences and suggest improvements for the next semester in the process analysis has thereby improved quite a lot.

The population investigated is far too small to generalize but for the two cohorts in question 2014 students were more successful establishing common rules and use project management becoming well-functioning groups than 2013 students who were struggling to get the teams to function.

3.2 Exam in CLP course 2013 versus 2014

The CLP course is clustered with another course when examined. Both courses counts 50 % of the result and the students are given pass or non-passed based on their answers in a written 7 hour exam.

*Table.2shows*the results of the exam for the two years in question. Although the CLP course is only half of the exam the scores in the CLP questions is comparable with the final result showing a significant difference in the number of students who failed the exam.

Looking at the scores in the CLP questions only the average score of the passed students in 2013 was 36 points or 72% of the maximum score (50 points) which in 2014 has risen to an average of 42 points or 84%. The passing level for the exam is 60 points so if the students should pass only the CLP part they need 30 points. In 2013 their average score was then only 6 point above the passing level but in 2014 this score was 12 points above passing level indicating that the average answers in 2014 had improved a lot since 2013.

Table 2. Exam result (Pas/No pas) 2013 and 2014

Year	2013	2014
Number of students	51	41
Number not submitted	9	7
Number submitted	42	34
Passed	34 (81%)	33 (97%)
Not passed	9 (19%)	1 (3%)

4 CONCLUSION

This paper has investigated the impact of a small change in the setup of the two most essential lessons in a course helping more reluctant students to develop their team skills when working with projects in a Problem Based Learning context.

Putting a small pressure on the students to hand in written answers from each team to mandatory exercises in the two lessons secured that most of the students participated actively in the lessons and those who was sick or otherwise prevented from participating was involved in the answers at a later point or at least informed of what their group had done in the exercises.

After a few weeks to incorporate the theories and methods from the exercises in the group's daily teamwork they had a consulting visit from the lecturer discussing the exercises and the experiences gained by using the suggestions in their teamwork. The lecturer emphasised reflections of the experiences and helped the students come up with eventual suggestions for improvement.

The students found this procedure very helpful and at the end of the semester all students except one passed the exam and the written process analysis describing how the teams had planned developed and improved their teamwork skills was significantly better than the years before.

This investigation is only in a very small scale and the cohort in question was far too small for the results to be generalized but still the results was so promising that it seems obvious to continue to use one hour extra on each team to read their assignment answers and give them a consulting meeting to help them improve their teamwork skills.

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