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# Working Seminar – a method for proactive learning in project based education

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**Abstract**—This paper presents a method for increased individual and collective student learning called *Working Seminar*. The method is based on the assumption that groups with a common base of knowledge increase both the group results and the individual learning. The method has been developed and tested in three courses and the results of student projects and the individual comments from students during and after the courses have been used to evaluate its value. The result shows that individual learning and project outcomes have increased with the use of the method.

**Index Terms**—students groups, project based learning, individual assessment, engineering education

## I. INTRODUCTION

THE *Working Seminar* method was initiated based on the supposition that if all students in a class and/or group studied and reflected on the same course material at the same time, both individual learning and group results would increase. The general experience my colleagues and I have is that some students study the material early in a course, some late, some extensively and some little. This has the effect that discussions in project groups, for example, are often focused on explaining and describing basic concepts and theories for those who have not yet studied the course material. Consequently, groups either do not use the course material to any greater extent or the level of discussion is rather low and primarily descriptive. Instead of in-depth discussions and reflections on how theories, methods and concepts really work in the context of student assignments or projects, time is spent on explanations. It also results in the potential uneven distribution of knowledge in a project group, something that hampers effective leaning.

Learning in teams or groups is common in higher engineering education. A review of courses at Lund University's Faculty of Engineering shows that the majority of them, especially late in the programs, involve group exercises and teamwork [1]. Several of these are organized as team-based projects and the assessment is, at least in part, based on

the project outcome. Hence, in assessing student knowledge and skills, team outcomes may not always reflect the students individually; some might be more knowledgeable than others, but this is difficult to determine since it is often an aggregated result that is assessed. Project based learning is an active learning environment that benefits from students being prepared early in the course for what is supposed to be achieved as well as with the course content needed for good project results and learning. Mills and Treagust [2] argue for increased use of project based learning since it challenges the lecture centric programs that dominate engineering and better illustrates real life situations in any workplace, something students need the skills to handle. However, the quality of the actual work being done in projects is sometimes unclear and it can be difficult to assess how much influence the course material (theories, methods, etc.) have had on the results presented. In addition, with limited use of course material both process and results are hampered leading to project/assignment outcomes of lower quality than expected and desired.

This paper presents and discusses a learning method in project based situations called *Working Seminar (WS)*. It is based on the assumption that groups with a common base of knowledge increase both the group results and the individual learning. The method was developed and tested in three advanced level courses in 2011.

The remainder of the paper is organized as follows: Section II presents a the method; Section III, the frame of reference; Section IV, a description of the working seminar method; and Section V, results and discussion. Conclusions are presented in the last section.

## II. METHOD

In two of the courses, Innovation Engineering (IE, 40 students, 4 projects, 10 credits) and Healthcare Innovation & Management (HCIM 17 students, 5 projects, 10 credits), the Working Seminar method was applied during the 2011 autumn semester. The third course was a trial version of the method tested in a Packaging Logistics class in Stellenbosch, South Africa, the previous spring 2011. The students were sent a three page document two weeks before the courses started explaining what the WS method was, the pedagogical idea behind it as well as the different material they were required to

study and reflect on in each WS.

The method was evaluated by: 1) observations during the semester, 2) the course evaluations by students, and 3) a content analysis comparison of project reports from the IE an HCIM courses with previous reports from past non-WS courses held in 2010.

### III. FRAME OF REFERENCE

Student preparation for assignments in a course is regarded by most as a critical component for learning and a challenge for educators [3]. If the preparation involves both individual studies and collective activities (i.e. peer learning activities), the potential for greater knowledge and skills is prevalent [4,5]. Peer learning communities are something Tosey and Gregory [4] examine and set five criteria for such communities to maximize learning: a) personal development, b) community interaction, c) facilitation, d) interdependency, and e) boundary management. Peer feedback is addressed by Boud et al. [5]. They define it as: “The use of teaching and learning strategies in which students learn with and from each other without the immediate intervention of a teacher” [5, p. 413]. Papinczak et al. [6] studied the use of peer assessment in PBL situations and highlight a number of benefits. But they also see a risk in the cooperative focus as something that in practice can instead become a competitive issue among students and student groups.

Project based learning focuses on active learning through experiences [7]. This kind of learning can be seen as a student driven investigation of a complex question or problem that culminates in a final outcome reflecting the results and process [8]. Consequently, the students develop deeper levels of understanding, problem solving, and communication skills essential in academia and industry [9].

### IV. THE WORKING SEMINAR METHOD

The purpose of the method is to support proactive studies of course material, increase collective learning among the students and teachers, and advance knowledge into experience and competence in project based learning. The method relies on a systematic advancement of learning through reflection, application and dialogue in four major stages. The aim is to provide the students, individually and collectively, with increased knowledge and insight of the course material and its application in the project setting.

A Working Seminar consists of four sequential stages (see Figure 1). The sequence is important in the advancement of learning as the knowledge and insights are collectively advanced if each individual is prepared. During the process, feedback loops are created as the interpretations of others can be discussed and new insights gained for the individuals and the group in their application of the new knowledge. The role of the teacher/s is to set the boundaries and help facilitate the discussions and in the third step, be part of the actual discussions reflecting on critical issues that the students put forward.

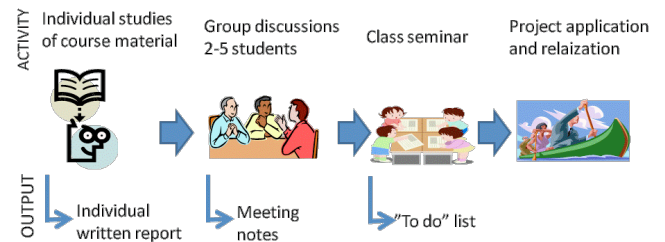


Figure 1. The four stages of the Working Seminar method.

#### A. Stage 1 – Individual studies and reflections

The first stage of a WS is focused on individual studies of provided material. This step can be done directly after the WS theme has been announced and the material specified and made available for the students. They are required to submit/upload an individual written report on the material studied before stage 2 begins. The report consists of two parts, a short summary of the material studied (maximum one page), and a reflection and discussion on how the material (i.e. essential aspects, theories, models, ideas) can be used in the projects they are participating in (one to two pages). A critical aspect for this stage to be successful is the selection of study material. In the courses in which I have applied WS, the material has been research articles, book chapters and video/podcasts. Most WSs have involved material that is contradictory or that is based on conflicting and/or challenging assumptions or standpoints. This is done for the student to get different perspectives on similar issues and (hopefully) reflect more on the similarities and differences as well as the value for the project in which the student is involved.

#### B. Stage 2 – Group discussion

In the second stage, the students team up in small groups (3-4 students per group recommended) and discuss the material. The purpose is to learn the material better by discussing each other's understanding of the different methods, theories, etc., presented as well as to discuss what and how it can be applied in the projects. This stage involves no teachers; instead the students are given full flexibility to initiate the discussion and choose when, where and how. They are also free to set up the discussion groups on the condition that everyone can participate in a group. However, as stated in stage 1, each student has to submit an individual report before the group discussion takes place.

Meeting notes from the discussions are to be submitted/uploaded no later than one day before stage 3 (class seminar). If this is not done, a much more extensive report on the WS theme has to be submitted within a week in order to pass the course.

The meeting notes are preferably written (however, a movie or other creative ways to communicate the discussions is encouraged). The meeting notes should reflect the key insights that the students gained from discussing the material, as well as questions and/or difficulties they have in understanding them or in their application to their projects.

#### C. Stage 3 – Class seminar

The third stage is a seminar with the whole class to discuss

and gain deeper knowledge about central concepts and aspects, difficulties and other issues raised by the students. This sharing of ideas and thoughts among the students and the teacher provides an overview of what has been found valuable and useful in the material. The class seminars have been carried out with different discussion methods and techniques (e.g. fish bowl, systemic meeting).

The required output from the class seminar is a prioritized list of things to do to increase knowledge and apply/realize what has been learned in the projects.

#### D. Stage 4 – Project application

In the final stage, the students are encouraged to test and use selected parts of the material in their projects. It can be one or several methods for gaining consumer insights, tools and techniques in making prototypes, mapping techniques in creating business models or evaluation tools of customer preferences. Hence, the focus is on turning knowledge into competence by using and testing what has been learned.

### V. RESULTS AND DISCUSSION

#### A. Increased quality of discussions

A positive teacher perception, though not surprising, was that the discussions among the students and in class became more insightful and mature. The students used their learning of the material in argumentation and asked each other critical and explanatory questions about the use of the theories and methods studied. This meant that instead of explaining the basics, the discussions in class were more advanced and went into detail on critical issues.

#### B. Student perceptions of their learning

The perceptions from the students on the WS differ while most see great benefits from being “forced” to read the course material and discuss it with course colleagues in the same time period. Based on course evaluations, all the students in the HCIM course were pleased or very pleased with the WS method. In the IE course, however, both positive and negative comments were raised. One IE student stated that: “The Working Seminar was very rewarding. Good models that everyone took part of, which provided us with a common basis in theory.” Another expressed that: “The Working Seminars are good but need to be further developed – there were a few too many and too little time to really absorb the information.” The HCIM students made similar comments during the course, expressing the value of discussing the material in several steps and that they found it useful in the projects. However, a comment both during the courses and after was the need for more time to reflect and relate the new learning to their own situation. Most of the time, the second stage was done the day before the class seminar (stage 3), which resulted in too short a time for reflection between the second and third stage. Another issue that came up in the IE course evaluation was the perception of a “hidden” agenda to check if the students had read the course material. One student wrote: “I didn’t like the WS structure at all. I got the feeling that the individual reports

were assigned because the teachers didn’t trust us to read the material.” While the method is also good for assessment, it is not good if it is interpreted as a tool for monitoring and not learning. This is of course something that needs more attention in further development.

#### C. Increased use of course material in project reports

The content analysis of project reports shows that there is a clear increase in the use of course material in them. For example in the IE 2010 course, a few methods were mentioned in the consumer insight reports while the in-depth use of this was almost entirely absent. Instead, the students had made their “own” simplified versions of the methods. In the IE 2011 reports, however, more methods and techniques were referred to but more importantly for learning, the ways in which they were used were much more expanded and complete.

### VI. CONCLUSIONS

There are several methods for increasing student learning using peer approaches and collective learning. The Working Seminar method is a contribution to this area as it manifests the proactive learning of course material in a cyclic manner from individual studies through collective discussions among students and teachers, and finally in application of the learning in relevant projects.

Further research is encouraged to provide students with systemic and proactive learning situations in which they can increase their learning together and develop the knowledge they gain into experience and competence as well.

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