# Integrating international students into a Project Organized Problem Based Learning environment

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Abstract <sup>3</sup>/<sub>4</sub> Project Organized PBL has become a widespread learning environment at engineering schools in Denmark. This study form demands competences in collaboration and project management for students. A course named Collaboration, Learning and Project management (CLP) has been developed at Aalborg University as a means to help students to achieve these competences.

More and more international master programs are introduced into Danish Universities in recent years. Meanwhile, some problems arise due to different cultural backgrounds.

This paper will describe a recent developed didactic model for CLP teaching. Further it will describe the content of the course and reflect how CLP course has been used as a solution to various problems regarding collaboration and project management to help integrate foreign students into a project organized PBL curriculum.

Although some problems of integration still remain unsolved, The CLP course seems like a promising approach to this kind of teaching.

#### INTRODUCTION

The learning environment at the engineering educations in Denmark has during the last 5 - 10 years changed from a traditional teaching-centered to a student-centered project organized Problem Based Learning (PBL) environment.

One characteristic of this learning environment is that students spend up to 50% of their study time working in project groups solving relevant problems. To study in groups presuppose students competences in areas such as collaboration and project management. To help students develop these competences at Aalborg University, it was found inadequate to only rely on a learning-by-doing approach [1]. Instead a course named Collaboration, Learning and Project management (CLP) has proven to be successful in increasing students' motivation and capability in doing group work and thereby in benefiting the learning outcome of their study [2], [3].

In resent years engineering educations have become more and more international, which results in multicultural classes in some departments. Earlier attempts to teach the same CLP course, which was successful in Danish classes, in multicultural classes failed. The reason for this is mainly that they took it for granted that international students with a different cultural and educational background are able to understand and perform in a Danish PBL environment without any special introduction.

This problem has called for a development of the CLP course that involves cultural understanding. In this paper we first want to point out what problems PBL based engineering educations are facing in multicultural classes. Based on experiences from Denmark we will then describe and reflect examples of how to teach multicultural students to collaborate in project groups.

#### WHAT ARE THE PROBLEMS?

Since problems in introducing international students to a project organized PBL learning environment are recognized in all engineering educations in Denmark, a national workshop was arranged at Aalborg University in October 2003. The purpose of the workshop was to outline problems and probe possible solutions. Based on the identified problems a number of questions were formulated to guide further research and development of teaching methods.

• How can the teacher practice intercultural sensitivity in his/her teaching?

In an intercultural class of 20 - 60 students from many different nationalities it is very important that the teacher is sensitive to cultural differences among the students. In a PBL-based learning environment teaching is often based on students' own questions in addition to traditional lecturing. However, in some cultures it will be regarded as impolite to ask questions and in others it will be shameful to exhibit lack of knowledge in public. *How to get students to appreciate and collaborate in a* 

PBL-based learning environment? This problem has two main aspects. One is that PBLbased learning means that focus will be on the learning process rather than only on the learning outcome. This is a student-centered approach, which forces the students to both find and answer the questions to learn from, using the teacher as a process facilitator. For students from some cultures this is a completely new way of learning. The other aspect is that in Denmark a PBL-based learning environment in most cases is synonymous with working in project groups up to 50% of the study time. It is well known that the success of this study form presupposes competences in collaboration and project management [1]. To teach

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such competences in an multicultural project group is a challenge that must be dealt with.

- How to motivate Danish students to actively participate in multicultural study programs? From the discussions on the workshop it became clear
- that one of the main problems is to integrate Danish students in the multicultural classes. It is not only the Danish students that tend to keep together and construct a cultural stereotype. It is a tendency among most cultures [4]. However it is regarded as important that Danish students integrate because they are familiar with the learning environment and can serve as change agents for students with different nationalities. Besides one of the objectives with having international classes is to learn how to collaborate in an multicultural environment.
- How to improve English language skills of teachers and students?

Good English language skills are a precondition for the success of an international class. This is especially important in a PBL-based learning environment because of the intensive dialogue between the participants. Often the lack of language skills is the main reason why some students are not able to fulfill a study programme. It is also important that the teachers have sufficient language skills.

## A COURSE IN COLLABORATION, LEARNING AND PROJECT MANAGEMENT (CLP)

Aalborg University has more than 20 years' experience in teaching students process competencies in a projectorganized PBL educational system.

Process competencies like collaboration and project management are learned and developed through practice – but at the same time they imply an awareness, which can be developed through reflection and experimentation.

In this section, the theoretical background of the course, "Collaboration, Learning, and Project Management" (CLP), will be presented together with examples of the contents.

## **Objectives of CLP course**

The CLP course is an introductory course aiming at introducing Danish and international students to a project organized PBL learning environment in which students are working in groups of 37 students. The objective of the course is to facilitate the students' learning of process competencies. The course includes theories and methods within the areas of co-operation, learning and project management.

## A didactic model of the CLP course

The didactic approach is based on an experience-based pedagogy, as the process competencies are in fact an integrated part of the individual's world of experiences. An important issue in the development of the model is therefore the question of how to develop an innovative practice. An important element of this is the question of how to balance the experiment and reflection approach in a learning strategy.

A learning theory model was developed at Aalborg University. It is illustrated in figure 1.



#### FIGURE 1. A DIDACTIC MODEL DEVELOPED TO UNDERSTAND THE THEORETICAL APPROACH OF THE CLP COURSE

The model serves two purposes. It is a description of a theoretical understanding of how students acquire process competencies. Furthermore, it is a didactic tool, which can be used by the teacher when planning his/her course. As can be seen from the following, our basic approach to facilitation of experimentation and reflection is based on Schön [5], [6] and Kolb [7].

The model is based on Kolbs learning circle, which means that the basic idea is that students are learning by reflecting their own experiences. The reflection makes it possible to get into an abstract conceptualization from which the students can plan experiments. Carrying out the experiments provides new experiences and so forth [7].

Schöns theory of the reflective practitioner has contributed to the model by providing a more detailed description of how to make use of reflection and experimentation in a learning process [5], [6]. The following is a description of how Kolbs- and Schöns ideas have been used in the model.

Common Sense Reflection means to be conscious of the experience. This is an everyday consciousness which Schön calls espoused theories [8]. The knowledge, which is gained from the experience, is not questioned like in Comparative *Reflection* where learning occurs through comparing different experiences. Finally, *Vertical Reflection* is based on induction and deduction, which makes it possible to pass from single experiences to more abstract categories and vice versa.

Included in the model is the three types of experiments developed by Schön: *The Explorative Experiment, the Movetesting Experiment* and *the Hypothesis Testing Experiment*. All three types of experiments can be contained in reflective practice, so the practitioner jumps from one type to the other [5].

The explorative experiment is "when action is undertaken only to see what follows, without accompanying predictions or expectations" [5:145]. The knowledge gained from this type of experiment is often tacit - the experimenter is just doing it - without having a clear oral formulation of what is going on - the action may lead to something useful maybe to nothing. The move-testing experiment implies that there is an intention – an intended consequence of the action. e.g. I do something in the group so that we get to know each other better - or in order to establish a better social environment. Finally, the third kind of experiment hypothesis testing is much more like a traditional experiment with formulated objectives and more complex hypothesis consisting of different variables. Compared to move-testing, hypothesis testing involves more cognitive knowledge togeth er with analytical skills.

In the didactic model (figure 1) the experimental processes necessarily imply corresponding reflective processes. The explorative experiment implies a type of common sense reflection, where the primary aim is to test for establishing awareness. Move testing contains the intended action and thus imply the comparative reflection. The hypothesis testing experiment also implies generalization of experiences and conceptualisation, because experiences have to be analysed before new actions are taken. Therefore, this type of experiment is connected to the vertical reflection. The model is further described in [3] and [9].

#### The content of the CLP course

The content of the CLP course for Danish students at the first year for engineering students in Aalborg University is based on four subjects:

- Learning and problem-based project work where the students learn about the learning environment
- Project management is about managing a project including making time schedules and organizational diagrams
- Organization and collaboration covers communication, conflict handling, distribution of tasks and division of labor among the group members.

 Using reflective a portfolio means that students learn to write a reflective portfolio in which they describe their experiences, reflect and generalize their learning outcome and suggest new experiments that will bring their learning further.

The course consists of ten lectures of four hours each. Seven lectures are taught at the first semester and three at the second semester. Normally a lecture will consist of short inputs that provide the necessary background to work with an exercise in which students get an experience with one of the subjects described above. The exercise will normally include some experimentations and a reflection on the learning outcome compared with the groups previous experiences.

#### CLP in an intercultural context

The model was developed with the objective of teaching Danish students to operate in a PBL-based learning environment. When teaching international classes, it is therefore important to reflect the multicultural perspectives of the model. This work is part of an ongoing research at Aalborg University. The most important issue of this work is to understand the cultural differences in how international students approach teaching based on the didactic model described above. One approach is an action learning approach where the objective is to facilitate learning experiences in which both students and the teacher can reflect and experiment with the PBL-based learning environment. In this way both students and teachers will become more experienced.

In the following session we will provide some examples of teaching derived from using this strategy.

# Experiences from teaching CLP in international classes

The following is examples of how CLP teaching has been approached in international classes. Each example is reflected in relation to the didactic model and the problems listed in the beginning of this paper. In both the Danish and the international classes, the purpose of the teaching is to obtain awareness of differences in the group members' understanding of each other's personalities and the common working process. The main difference in teaching Danish and international classes is that in the Danish classes the focus is on individual differences whereas it is both individual and cultural differences in the international classes. The first example deals primarily with individual differences whereas the second primarily deals with cultural differences.

• Felders learning style test [10] is used to provide students with knowledge about their preferences for learning. Learning styles are divided in four dimensions.

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Active versus Reflective, Sensing versus Intuitive, Visual versus Verbal and Sequential versus Global [10]. The teacher facilitated some discussions among the students. For instance, they were asked to reflect their preferences on the teaching styles they are exposed to. Afterwards, the students were asked to discuss possible consequences for collaboration in their group. E.g. if most of them are visual they should work on visualizing their project. The objective in this exercise is to make the students aware of their own potentials as learners and to make them reflect a learning strat egy in relation to both classroom teaching and group work. This is especially essential for international students because they are confronted with a new learning environment that makes both experimentation and reflection important. In this exercise the students are engaged in both comparative and vertical reflection together with move testing experimenting.

- Working in cross-cultural groups the students described to each other how they are used to deal with different aspects of communication in their own culture. For example how to conduct a meeting, how to greet other people and how to communicate in relation to authorities. Similar exercises are proposed by [4]. The results of the discussions are discussed in the group and presented for the class on a poster. The objective of this exercise is to let the students provide knowledge they can use to work out a collaboration agreement. Writing a collaboration agreement will engage the students in reflecting the cultural differences and can be regarded as setting up an experiment in collaboration. Finally the teacher can provide general knowledge about cultural differences and make the students compare with their own ideas.
- At the Engineering Collage in Aarhus (Denmark), students attending an international class were asked to meet one week before the start of the semester. During this week they were working in multicultural groups solving tasks as to find out where to find the items on a shopping list, finding out the opening hours of different shops, investigating the health care system in Denmark and the like. This way the students had the opportunity to get to know each other in a PBL-based learning environment, solving problems of impotents for them self. Further, they can feel safe because they are not confronted with professional demands at the same time as they are getting their first experience with a new learning environment. This is an answer to the problem of exhibiting lack of knowledge in public. In this exercise they are primary engage in explorative experiments and common sense reflections through which they gain knowledge of Danish culture. The exercise could easily be developed to include move testing and comparative reflections by facilitating discussions about differences and similarities between Danish culture and the students' own culture.

# CONCLUSION

To reflect the examples from CLP teaching in international classes on the questions we put at the beginning of this paper, it is mainly the problem of how to get students to appreciate and collaborate in a PBL-based learning environment that has been worked on. Still we need the development of teaching methods to deal with the remaining problems of teachers' intercultural sensitivity, Danish students participation in international classes and the English language. National working group are currently working on these problems in Denmark.

The didactic model presented in this paper seems, though developed for Danish students, useful as a framework for CLP teaching in international classes. The main objective of the teaching derived from the model is to develop the students' awareness of individual differences as well as cultural differences. To do this a reflecting and experimenting learning environment like the one offered from the model seems as a promising approach.

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