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Developing Intercultural Competencies in a PBL Environment

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Abstract

This paper discusses the influences of international programs in a problem based, project and group work organized learning (PBL) environment on the development of intercultural competencies. Based on the discussion of the positive effects as well as the observed barriers in the educational practice of international programs, this paper suggests that PBL can be a good example of a supportive learning environment in terms of providing students opportunities to develop intercultural competences. However, in order to make the best of international programs as an intercultural learning context, it is important to 1) establish a shared understanding of 'international', based on which, new values and practices can be established instead of merely applying the established Danish ways of studying, 2) to bring about more awareness that international programs should be beneficial learning contexts in which students from different cultures can learn from each other and develop intercultural competencies together.

Keywords: intercultural competences, PBL environment, engineering education

1. INTRODUCTION

Under the impact of globalization, higher education in the 21st century faces new changes - to orient towards global markets, which means to prepare the students with competencies of working in intercultural contexts. In engineering education, requirements of developing these competencies have been reflected in the accreditation of engineering programs in different countries. As can be cited from the program outcomes and assessment in the Accreditation of Engineering Programs in the U.S. (ABET 2000), 'applied science programs must demonstrate that graduates have … (g) an ability to communicate effectively, (h) the broad education necessary to understand the impact of solutions in a global and societal context…' Similar statement can also be found in the accreditation of European Engineering Programmes and

Graduates (ERU-ACE 2005) and the study guidelines for study programs in Danish engineering education (AAU 2003). Following both of them, in this paper we define intercultural competencies as capabilities of 'working in an international environment with appropriate consideration on differences in culture, language, and social and economic factors'.

How can universities prepare students with intercultural competences? In the Danish context, there have been two related educational practices: 1) to encourage Danish students to go abroad for short-term (one semester for example) study experiences; 2) to establish international programs and invite foreign students to study in Denmark. This paper will only focus on discussing the second practice.

The problem based, project and group work organized learning (PBL) environment has been implemented in some Danish universities for about 30 years. The most important innovative aspect of PBL educational concept is 'the shift from teaching to learning, and consequently the task of the teacher is altered from the transferring of knowledge into facilitating to learn (Kolmos 2002)'. It particularly provides chances for students to communicate and collaborate through working on projects in groups. In the study programs for Danish students, it has been identified as an efficient way of educating engineering students with not only technical skills but also social skills like communication, management and organization (Du 2006).

At the international programs, students are provided opportunities to learn in an intercultural environment, when they do project work in teams that are made up of students with different cultural backgrounds. In this sense, international programs in a PBL environment can be assumed to be an effective milieu in which all students can develop intercultural competencies in their learning process. However; experiences from the current educational practice showed that it is more complex than what has been expected.

This paper aims to examine the influences of international programs in a PBL environment at Aalborg University (AAU) with focus on the development of intercultural competences. Based on empirical evidence that is drawn from both teaching and research experiences, this paper discusses the positive effects of international programs in a PBL environment as well as the

observed barriers in the development of intercultural competences. As a conclusion, this paper suggests that PBL can be a good example of a supportive learning environment in terms of providing students opportunities to develop intercultural competences. However, in order to make the best of international programs as an intercultural learning context, it is important to 1) establish a shared understanding of 'international', based on which, new values and practices can be established instead of merely applying the established Danish ways of studying, 2) to bring about more awareness that international programs should be beneficial learning contexts in which students from different cultures can learn from each other and develop intercultural competencies together.

2. THE APPLICATION OF PBL CONCEPTS TO EDUCATIONAL PRACTICE

The theoretical departure for the understanding of PBL derives from the constructivist-sociocultural approach in terms of understanding and examining learning and education, which in the past decade have played a prominent role in the educational development in western countries (Jarvis *et al* 1998). The general belief is that learning takes place from the interaction between the individuals, and it is a changing process in a certain sociocultural context. In relation to the application of PBL concept in educational practice, this approach helps to promote the recognition that learning processes will cover the formation and transformation process of a self, and with knowledge and ability of cooperating, reflecting and coping with society in general (Henriksen 2006). In this way, education and learning is related to a broader social transformation in the process of globalization and in the development towards a knowledge society.

The PBL concept has various definitions and ways in application. In relation to engineering education, PBL concept is regarded as a successful and innovative educational method for engineering education (Graaff 2001). Graaff and Kolmos (2003) formulate three common approaches characterizing PBL: learning – content – social approaches.

1) The **learning approach** refers to three aspects: learning is organized around a) *problems,* because the formulation of them allows the learning contents to be related to b) *the context*, and

in the learning process, c) *experiences* are especially important in relation to which problems the student is attracted to on the basis of his/her own understanding and interests.

2) The **content approach** concerns three aspects as well: a) Interdisciplinary learning[1], b) Exemplary practice[2], c) Theory-practice[3].

3) The **social approach** refers to team-based learning which means that the majority of the learning processes take place in groups and teams. It underpins the learning process as a social act where learning takes place through dialogue and communication. Students are not only learning from each other – they also learn to share knowledge and organize the process of collaborative learning.

In the context of Aalborg University, Denmark, the learning principles of the PBL Aalborg Model is founded on problem-based project work, in which approximately one half of the students' time is spent on project work in teams, whereas the other half is spent on more or less traditional lectures. The project work is formulated within the framework of a given theme, related to the overall educational objectives, which can be a broad, open theme or a subject-related limited theme. The students are allowed to formulate their project proposal themselves, but there will always be a supervisor, who approves the proposal. All project work is made in groups, and the same model is followed from the 1st semester until the completion of a masters' degree. During the span of the university degree programme, the groups normally become smaller, starting with typically 6-7 students in the 1st year and reduced to approximately 2-3 students in the final semester. Each group has one or several supervisors. The role of the

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[1] *Interdisciplinary learning* relates to the dimension of knowledge as the solution to the problem formulation, which may span across traditional subject-related boundaries and methods. This principle is critical for the organization of the teaching because teachers often consider objectives within the known subject-oriented framework, rather than problems or situations.

[2] *Exemplary practice* is concerned with ensuring that the student's learning output is exemplary in accordance with the framework of the objectives. This is an extremely central principle because the student must engage in a deeper understanding of the selected complex problem formulation.

[3] *Theory-practice* means that the students gain abilities to analyze problems by using theories. During the entire learning process, they learn the art of analysis as they are required to analyze problems, analyze solutions, develop solutions, and analyze the impact of given solutions.

supervisor is to give response to the students' project process along the way and not least to run the examination.

The PBL environment has been identified as a supportive learning milieu in which students are provided opportunities to develop active learning, self-directed learning and meaningful learning. In this learning process, students do not only gain scientific knowledge, technical skills, but also capabilities of managing project and team work as well as professional responsibilities in order to prepare themselves for the workplace (Du 2006).

3. RESOURCES OF EMPIRICAL EVIDENCE

This paper aims to examine the influence of international programs in a PBL environment on the development of intercultural competences. Empirical evidence of this paper is drawn on both teaching experiences and research work with an aim of understanding and promoting intercultural teaching and learning. Resources that are used in this paper are mainly from international programs at two engineering departments at Aalborg University (AAU). Empirical data are mainly from 1) teaching experiences in Project Organized Learning (POL) courses in the department of Electrical and Electronics Computer Engineering. POL course aims to provide foreign students with learning tools when studying in PBL environment; 2) teaching experiences as well as a survey conducted in a master program in Urban Planning and Management; 3) qualitative interviews and observations of selected project groups in both of the departments.

4 FINDINGS AND DISCUSSIONS

The current international programs at Aalborg University provide 2-year-long education, in which students are expected to do about 3-4 projects before they can be awarded a master degree. With the participation of students who come from different countries in the world, the learning environment turns more and more international. In this sense, international programs in a PBL environment can be assumed to be an effective strategy regarding facilitating intercultural competencies for all students. However; experiences from conducted educational practice showed that it is more complex than what has been expected. The following discussion fall into

two aspects: 1) What are the influence of the PBL environment on the development of intercultural competencies? 2) What are the issues and problems arising in the processes?

4.1 Influence of the PBL environment on the development of intercultural competencies

Both teaching and research experiences show that the PBL environment has similar as well as different effects on foreign students and on Danish students in the learning processes.

Positive effect on foreign students

The major influences on foreign students lie in the new methods of learning and the international context. For the majority of them, it is the first time to study through doing projects in groups. Based on their reflections, this method provides them challenging and constructive learning experiences in an international context.

At the beginning of each semester, students form project groups (normally from 2-6 students in each group) based on their shared interests in solving professional problems. To get the project started, students need to search for the information on the background and context, to find relevant literature, to read theoretical articles, to discuss with supervisors or people who know the area, and they might also need to contact industries or companies for interviews or observations to gain field knowledge. When they have collected enough material, they start to analyze the situation and formulate the problem. The next stage is to find out how to solve the problem and choose one of the solutions, and this involves the same procedures of searching, reading, discussing and writing. In this process, they are facilitated with the knowledge from literature, lectures, and supervision; however, they are expected to relate these different knowledge resources to their project. They need to develop different strategies to gain theoretical knowledge, methods, and context knowledge in order to solve the problem. Instead of following the procedures designed by the teachers, students are expected to manage the project planning on their own.

Picture 1

Picture 1 shows how a group of international students work together in their project room. They use blackboard as assistance in their discussion in order to avoid unnecessary misunderstanding in communication since the English language is not the first language for any of them. Everybody writes down their thoughts on the blackboard to explain how they understand and suggest things.

In general, working in groups provides sufficient chances to share information. Peer learning through group discussion is identified as an effective way of studying technical things. Collaboration in the group work also helps to encourage participation and promote the sense of responsibilities. They bring in different values into the shared practices from the reflection on their past experiences from different contexts. Group work involves discussing, reaching agreements, writing, etc. which demands the awareness and skills of communication, cooperation and management. During an interview with the students in a group (see picture2), they summarized what they have learned in the process of working on group projects: 1) new angles of looking at things, 2) better understanding of different approaches to tasks based on different educational backgrounds and cultural backgrounds, 3) methods of handling different situations, like being patient with others, dealing with disagreement by compromising, being both organized and flexible, etc.

Picture 2

However, there is a progression during the study from having difficulties understanding why doing project in groups to thinking of this study method as a positive learning resource. In this processes, students learn to learn from mistakes and experiences. Longitude teaching experiences show that external assistance on reflection can speed up this progress and reduce difficulties for students. In the Master programs at Department of Electrical, Electronics and Computer Engineering (EE), curriculum for the first semester is focused on learning how to learn in the PBL environment. As beginners, students are also provided a course named Project Organized Learning, which aims to provide introduction to PBL concepts and practices in the context of AAU. In addition, students are also provided knowledge as well as tools for cultural differences in communication and learning, project planning, learning methods, collaboration and cooperation in team work (for example how to provide constructive comments, how to handle disagreements, and how to reach positive communication etc). POL courses are provided hand-in-hand with the process of the first project. In this way, students learn to develop project management systems through team work along the way of doing the first trial. This course has been evaluated by the foreign students as a useful tool in the process of getting used to the PBL learning environment.

Positive effect on Danish students

Learning through doing projects in groups is in general identified as a beneficial way of learning by Danish students (Du 2006). At the Danish programs, discussions in the group regarding how

to relate information from lectures and textbook knowledge to the project work provide a context to understand technical contents in a deeper and more meaningful way. Peer learning through shared practice is appreciated as an efficient learning strategy in terms of sharing information resources and getting inspiration. Good atmosphere and successful cooperation is specially recognized as great motivation to get work done and to achieve the goal of learning. When reaching the master level of education, Danish students are expected to participate in international programs because it is a good opportunity to study in an international environment without having to travel.

The practice of the International Master Program in Urban Planning and Management (UPM) provides a good example of attracting Danish students to participate in project work in international groups. With the expectation of knowing more about other cultures, they have positive attitudes in the process of group work during the first semester. Based on their reflection, foreign students bring in different ways of working, which provided chances to reflect and rethink their established ways of doing group work. This brings about constructive challenges to their established ways of thinking and learning.

4.2 Challenges and identified barriers

In spite of the constructive influences, there have been observed different problematic issues that have brought about difficulties for students in the learning processes. In this paper, the main issues that have turned into barriers to the development of intercultural competences are summarized.

1) Language remains the first problematic issue confronting group work in an international context. The use of a second language (English) brings about lots of difficulties in both daily communication and professional discussion. However, different strategies have been developed to solve this problem when students get more familiar with each other.

2) Having different educational backgrounds, students hold different beliefs on learning. It is difficult for the majority of the foreign students, who come from learning environments in

which they are guided by instructors who knows answers of all the assignment, to understand the concept of PBL. It demands time and experiences to understand the idea of learning with problem orientation and project organization, which means that nobody knows the exact answer until the project is finished, and students need take the responsibility to manage their own learning instead of only receiving instruction from authority passively.

3) It is difficult for many foreign students to understand that group work can be an efficient way of learning. In the Danish context, it is closely related to the social and political culture of democracy as well as the constructive approach in the belief of learning (for example, the creation of knowledge can come from everybody's participation and information sharing). In some cultures where competition is highly encouraged and individual achievement is greatly valued in the assessment, group work does not have a cultural meaning to exist in the educational context. Due to these differences, many foreign students have different perceptions on the group-based assessment, compared with Danish students who are familiar with group work since primary school. When reflecting on their experiences of group-based exams (the report and oral defence), many foreign students had negative opinions: a) they (in the same group) made different efforts but got the same marks in the exam, b) they worked harder and did better job but got lower mark than other groups due to the subjective criteria in the assessment (differences among examiners), c) their individual achievement is not visible, and d) they could not see the benefit of learning if in their future workplace individual capabilities are more demanded.

4) Having different cultural backgrounds, students bring different social values, which can bring about miscommunication in the management of group projects. The main cultural differences are reflected in the behavioural patterns (what are good or bad manners), values on timing and efficiency (punctuality), ways of conducting meetings, handlings disagreement and reach agreement, perceptions on the role of teaching (authority vs. facilitation), attitudes towards learning (process-oriented vs. outcome-focused). Peer evaluation appeared to be much more difficult to be appreciated in a multicultural context than in the Danish group context.

5) There is a general lack of collaboration between Danish students and foreign students. In the case of UPM, on one hand, some Danish students changed their positive attitudes after the first project in international groups because they were disappointed that foreign students did not have as much expected knowledge as the Danish students did; therefore, they had to spend lots of energy teaching foreign students how to do things. On the other hand, foreign students felt that they had to adapt themselves to learn the Danish ways of doing things, because Danish students tend to take things for granted and teach foreign students how to do projects in the established ways that they have been used to. In this way, Danish students lose some chances to develop intercultural competencies when they are reluctant to work together with foreign students.

5. CONCLUSIONS

To summarize the findings from these investigations, studying engineering at international master programs in the PBL environment, students are provided multiple learning resources to develop not only scientific knowledge, technical competences, but also process competencies like different social skills of communication and management. It is also a process whereby students develop intercultural competencies when this learning process takes place in an international context.

This paper argues that some concerns need to be taken into consideration in order to make the best benefit of international programs as an intercultural learning context. Firstly, in order to benefit students from different cultural and educational backgrounds, the facilitation of the PBL environment should not just be based on the established practices from the Danish programs. In the establishment of international study programs, it is necessary to have a shared understanding of the concept of 'international', based on which, new values and practices can be established with the purpose of providing students learning opportunities to develop intercultural competencies as well as other capabilities. It is also necessary to bring about the general awareness that international programs can be beneficial learning contexts in which students from different cultures can learn from each other and develop intercultural competencies together.

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