



Developing teaching by implementing Problem Based Learning

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**Development Project Report
May 2007**



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Teacher Education College

Author(s) Franssila Tommi	Type of Publication Development project report	
	Pages 32	Language English
	Confidential <input type="checkbox"/> Until _____	
Title Developing teaching by implementing problem based learning		
Degree Programme Teacher Education College		
Tutor(s) Burns Eila		
Assigned by Jyväskylä University of Applied Sciences, Engineering and Technology, Logistic		
Abstract <p>This development project is an implementation plan for problem based learning method in to the field of logistics engineering education. The report considers theoretical content of problem based learning method and the recommendation for implementation into teaching. The main focus is to concentrate on the actual planning of actions for the implementation. The course where the plan is made for is a part of professional studies in Logistics Engineering Programme in Jyväskylä University of Applied Sciences.</p> <p>The report gives insight to the seven steps of problem based learning method. Also different roles in PBL method are being discovered. The role of the course Logistics Management Systems 2, as a part of Logistics Engineering Educations professional studies, is explained so that the reader will understand the motive for PBL implementation. In the implementation the emphasis is on planning facilities and practical issues. Facilities consist of both physical facilities and virtual learning environment. Practical issues consist of introduction, weekly schedule, cases, feedback and assessment.</p>		
Keywords PBL, Problem Based Learning, Implementation, Constructive learning		
Miscellaneous Appendixes 2 Pages		

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1. Introduction

This development work introduces an implementation plan for a problem based learning method within Logistics Engineering studies. It bases on of using a case study. The idea is to implement PBL learning method in to teaching.

First time when I saw PBL used in practice was in Voralberg Fachhochschule in Dornbirn, Austria during the European Forum of Logistics Engineering in October 2004. I began my professional career as a lecturer in August 2004 and I was happy to be sent to EFLE forum already during my first autumn of teaching. EFLE is an international forum for logistic educators which is being organised each autumn in different European country. EFLE 2007 in Jyväskylä is already 14th annual EFLE forum. During the EFLE forum in Dornbirn I took part in a seminar where PBL teaching method was demonstrated. Before demo lessons the participants were given an introductory lesson of PBL . In this introductory lesson we were informed the principles of PBL as well as the way it is being used in Voralberg Fachhochschule and especially in teaching of the special subject we were going to follow.

It was very interesting to follow these PBL lessons as an observer. A group of seven students were sitting in a kind of meeting. One student was a chairwoman, another one was a secretary, five others were participants. Lecturer or instructor introduced students a case in a form of problem or a challenge from production management area of science. Lessons contained a specific agenda. First students discussed about the case. They collected some new sentences and theoretical things from the case. They made a division of tasks too. It was remarkable that chairwoman and secretary managed to do their job properly. The role of the lecturer was to follow the conversations and to control things. Demo lessons consisted of two parts. In the first part students basically created a big picture and found out what they still need to clarify. After the first part there was a break and students went for example to libraries to find out solutions for problems that each of them had and which needed to be solved for the next period of lessons. In a real PBL session the break between these two sub parts is at least several days but in demo lessons it was only a couple of hours.

In the second part of demo lessons students clarified things that they had planned during the first part of lessons. Students had theoretical explanations. They drew diagrams and explained things and formulated solutions to challenges or problems that were given in previously. The role of the lecturer was again like to control things and make sure that all targets of lessons were achieved. Later on I discussed with both students who took part in to the demo lessons and the lecturer who was in response of lessons. All students were very fond of this method of learning. They said that it is more motivating way to study and also learning is more effective when comparing to normal teacher centered learning methods. The instructive lecturer, Mr. Bernhard Blessing, pointed out that even the role of lecturer is like a controller still the planning and running lessons is not easier than in normal way of teaching by lecturing things. Mr. Blessing also found PBL as an effective way to teach things and encouraged me to try this method in practise. He explained me that in Voralberg they use this method as a prevailing method of teaching different things. These demo lessons were the origin of my interest to implement PBL also to my teaching repertoire.

The author is responsible for the course Logistics Management Information Systems in department of Logistics in faculty of Engineering and Technology in Jyväskylä University of Applied Sciences. The course consists of several parts and some of them may be suitable to teach using the method of problem based learning.

The aim of this development work is to create a plan and basis for implementing PBL method into my teaching. The course in which I want to implement PBL is Logistic Information Systems 2. The actual implementation will take place, hopefully, in Autumn 2007. This development work creates basis for the PBL in this course. The targets for this plan are following:

- how to use PBL during the Logistic Information Systems 2 course
- what is the extent of PBL comparing to whole course
- what is the preparative work for lessons with PBL
- what is the overall plan for the whole course including also PBL lessons

When and if I manage to achieve these targets it will help concretely to develop my real work and then I am happy for this development work.

This development work includes the planning of PBL implementation. It does not include the report of actual PBL session or results of it because the implementation will take place next Autumn.

2. The Logistic Information Systems 2, course current situation

2.1 Logistic faculty and structure of studies

Logistic faculty is one of the three departments in Engineering and Technology of Jyväskylä University of Applied Sciences. It has a long history as educator of logistics engineers in Finland. Actually it is the first logistic engineers educator in Finland and at the moment still the biggest logistic engineer educator when calculating the amount of annually graduated engineers. The following graph describes the organisational position of logistic faculty.

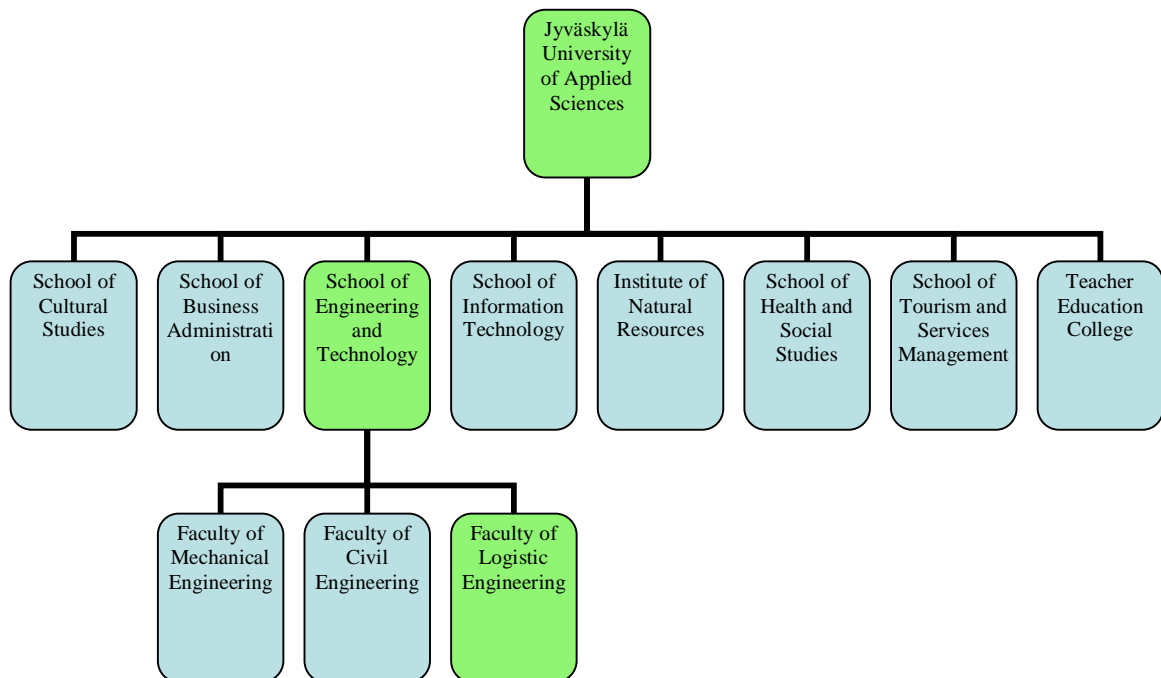


Figure 1. The organizational Position of Faculty of Logistic Engineering.

Inside the Logistic Faculty two main programmes are offered that educate logistic engineers. Degree programme in Logistics educates engineers in Finnish language and there is a possibility to study degree programme in Logistics Engineering in English language. In Finnish language programme most of the students are naturally Finnish and in English language programme half of the students are Finnish and half are foreign students from all over the world. In this development work I will concentrate to develop a course which is a

part of the Finnish language degree programme. In addition to these Bachelor of Engineering degrees the faculty has also started the master level degree and several programmes that are targeted to offer educational services for companies. Also research and development work forms a strong and important part of Logistic faculty.

Bachelor degree programme in Logistic has annual intake of about 30 students – in 2006 and 2007. The idea is that student will graduate in about 4 years when studying as a Bachelor of Engineering. This means totally 240 ECTS points. These 240 ECTS points consist of basic studies (60 ECTS), professional studies (120 ECTS), elective studies (15 ECTS), practical training (30 ECTS) and Bachelor's thesis (15 ECTS). During their third year of studies students have, as a part of their professional studies, a possibility to choose a specialisation area from one of the possibilities: Transportation Systems, Materials Handling and Telematics. The sub course Logistic Information Systems 2 is a part of Telematics studies. The following picture describes the structure of studies in Logistics programme and more specifically the role of Telematics in it.

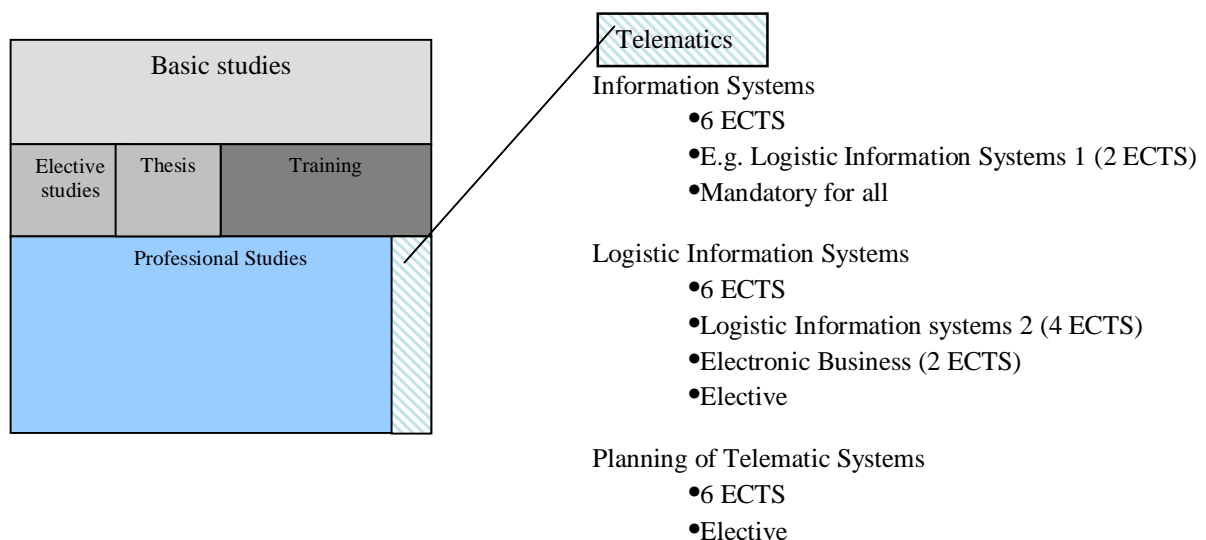


Figure 2. The role of Telematics in Logistics studies.

Information Systems is a mandatory for all students in the second year of their studies. During this course students are thought basic technological skills regarding information systems. This means data communication, databases and Logistic Information Systems 1 which covers

basics of Software engineering, Business process management and basics of Enterprise Resource Planning systems. Those students who choose Telematics as their professional area will first have the course Logistic Information Systems. It consists of two sub course: Electronic Business (2 ECTS) and Logistic Information Systems 2 (4 ECTS). Logistic Information System 2 is the target course for this development work. The last part of telematic systems studies is the course planning of telematic systems. It covers positioning systems, identification systems, satellite systems and implementing telematic systems project studies. In the following chapters I will introduce in more specifically way the current situation of the course Logistic Information Systems 2 which is the target course to be developed in this work.

2.2 Logistic Information Systems 2, idea and nature

Subcourse Logistic Information Systems 2 is of 4 ECTS and is a dominant part of Logistic Information Systems course. The total of Logistic Information Systems course is of 6 ECTS credits. In addition to the course Logistic Information Systems 2, it also covers the course of Electrical Business which is 2 ECTS. The following picture clarifies the structure of the course.

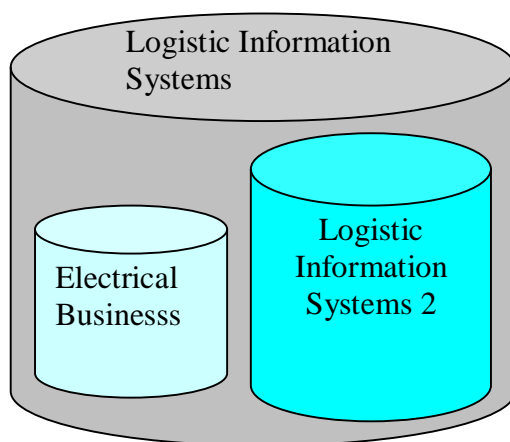


Figure 3. Logistic Information System Course consists of the subcourses: Electrical Business (2ECTS) and Logistic Information Systems 2 (4 ECTS).

The basic idea is that, when in previous Information Systems course students were thought mainly technical basic skills and understanding the role of Information Systems in Logistic, in the Logistic Information Systems course students are thought more applicative skills regarding Logistic Information Systems.

The subcourse Logistic Information Systems 2 covers firstly some revision and deepening of the area of Business Process Management. After that most important Logistic Management Information Systems are being introduced from applicative point of view. Students will have some practical trainings too. There are also several visiting lectures from each specialists teaching area. My role, as a responsible teacher, is to handle the wholeness of pretty ramified course. I also teach myself about half of contact lessons.

The amount of contact lessons for 4 ECTS course is about 50 hours. These hours are divided into 13-14 weeks so that each week there are two times two hours sessions. Lessons are at the moment pretty traditional teacher guided lessons. Sometimes teacher gives a lecture but most often teacher gives a lecture and after that topics are practised or used in real life situations.

The size of student group is normally 5-12. This because the course is from area of specialisation. It is only meant for those students who select telematics as their area of specialisation. The big annual group of logistic students is being divided into more or less equally three different specialisation areas. The smaller group size gives the course a specific intimacy, efficiency and possibilities. I have been thinking and analysing several possibilities how to utilise this thing. Maybe I could build a PBL structure of my contact lessons and in addition, students might have visiting lectures and trainings.

2.3 Logistic Information Systems 2, content

As mentioned in the previous chapter the subcourse of Logistic Information Systems 2 has pretty ramified nature. Firstly, there is revision and deepening of Business Process Management and it works as a guidance to Enterprise Resource Planning Systems which is

being shortened normally in the form ERP. After studying ERP theoretically we will train practically the ERP system called SAP. Students have practical tasks of how to manage the SAP system. The trainings with SAP system takes 4-5 weeks so it has pretty big role in the subcourse of Logistic Management Systems 2.

There are still other Logistic Information Systems that we are being studied during the course. Product Data Management systems (PDM) is one very important and then there are also Customer Relationship Management systems and document management which are very important in projects when implementing different information systems.

The Integrated Logistic Support (ILS) area is one of Logistic departments specialisation areas. Courses for business life are being organised in this area. Basics of the ILS I teach myself but I also use visiting lectures from the faculty to give specific knowledge of ILS for students.

The existing weekly plan of the course is represented in an appendix 1 (p. 31).

2.4 Logistic Information Systems 2, SWOT analysis

SWOT analysis is a useful method when analysing a current situation of the Logistic Information Systems 2 course. The idea of SWOT analysis origins from 1970s when it was developed by Boston Consulting Group. The idea is to analyse strengths (S), weaknesses (W), opportunities (O) and threats (T) from the target of analysis.

In this specific development work I will use SWOT analysis to logically describe current situation of the Logistic Information Systems 2 course. I will use results of SWOT to find areas for development and to find efficient way to implement PBL method in to teaching. In the following list I have picked up different areas of SWOT analysis.

Strengths

- Responsible teacher has good basic knowledge of all areas
- Good learning facilities for the course
 - SAP system in use
 - R5 learning environment
- Motivated students

Weaknesses

- Ramified content of the course
- The wholeness of the course is not fully analysed from efficient learning point of view

Opportunities

- Motivated students
- Different studying methods
- Small student group
- Good and large selection of facilities for studying
- Skillful visiting lectures
- Good connections to business life
- Strong R&D of Logistic faculty

Threats

- Numerous systems, areas and teachers in the course depresses the interest of students
- Not enough students to organise efficient lessons

It is obvious that the ramified nature of the course is something which is necessary to develop. It is necessary to find a thread to follow. This thread should be something that gives a certain structure for the course. This basic structure would work as a ground strategy for the course. Other important things inside the course are that visiting lectures, excursions and training of logistic management information systems should support this basic strategy. I hope that

implementing of PBL into teaching might provide this basic strategy. At least it feels like worth to trying.

In the next chapter I analyse the method of problem based learning from theoretical point of view. I will focus on the findings which may help me in the actual implementing project of PBL method.

3. Problem Based Learning

3.1 Background of Problem Based Learning method

Problem based learning method has been used in teaching already more than 30 years. Maybe the best known original examples come from 1960s from American medical education (Barrows 1985). Nowadays PBL method is being used in various areas of science and teaching, for example architecture, economics, engineering, mathematics and law (Poikela, Poikela, 2005). The basic idea from original sources were to find practical problems for students of medicine. It was revolutionary compared to the previous studying methods which were based on teacher focused lectures. Using this new method students were given problems based on practical examples and they were forced to find solutions to these problems in a group. The original beautiful idea was to bring teaching and learning in the classroom as close as possible to the problems and cases in real medical environments like doctors and hospitals. The idea was also to support life-long-learning because doctors and nurses could use the method of PBL also after graduating in real working environment.

In Finland PBL is still quite young teaching method comparing to international examples. First national PBL program started in Tampere University in 1994 in the area of medicine (Poikela, 2002). Also in Finland the science of Medical area acted like a pioneer in this field of education because the second example is from Pirkanmaa University of Applied Sciences in the field of Physiotherapy (Poikela 2002). After that PBL has become popular ,in Finland too, as one good alternative to traditional teacher focused lecturing in various areas of education.

PBL can be used as a pedagogical teaching method for a single course or even for a programme. Still there are many examples nowadays in which PBL works as a strategic keystone of teaching for the whole University or other pedagogical institute. This means that most of the teaching is based on to the use of PBL method. Famous institutes that are focusing most of their teaching on using of PBL method are for example Aalborg University in

Denmark (<http://www.auc.dk/fak-tekn/fink.htm>), Illinois Mathematics and Science Academy in USA (<http://www.imsa.edu/team/cpbl/cpbl.html>), Queens University of Kingston Ontario in Canada (<http://meds.queensu.ca/medicine/pbl/pblhome.htm>), San Diego University in USA (<http://edweb.sdsu.edu/clrit/home.html>), Maastricht University in the Netherlands (<http://www.unimaas.nl/pbl>) and Linköping University in Sweden (<http://www.liu.se/utbildning/programinfo/om/pbl.html>).

3.2 Strategy and the idea of learning in Problem Based Learning

3.2.1 Different roles during the learning situation when using PBL

The ideal student group size when using of PBL method is 5-8 students. Learning in actual learning situations is very much student oriented. The role of the teacher is more like a tutor oriented. According to report by Educational development unit of the University of Oulu (<http://www.oulu.fi/opetkeh/kehtoimi/PBL/pblroolit.html>) There are several roles for attendants in the pure example of actual learning situation when using PBL method.

The role of the teacher is to be a tutor. He or she offers a stimulus for students. This stimulus is the actual problem in a form of case or something else that students start to work with. After tutor has given students the stimulus the tutors role is to remain silent. This does not mean that teacher could go out of the class, not at all. The role of the tutor is to follow and when necessary to control the learning situation. When necessary tutor should guide students to the right way if students have somehow lost the touch to the subject. Tutor may also give students advice, ideas and concepts if he/she sees it necessary. The role of the tutor is therefore very much to be an active listener during the learning situation.

In the group of students one works as a chairman or maybe a better word is a discussion leader of the learning situation and one as a secretary. It is necessary that these roles change so that all the students need to work as a discussion leader or secretary.

The role of the discussion leader is to be the leader of the learning situation and activate other students if necessary. Discussion leader provides opportunities to speak during learning situations. It is very important that the discussion leader prepares him-herself beforehand to the learning situation. His or her job is to keep learning situation in logical path, carefully analyse and summarize students points and opinions and make questions for other students to keep up negotiations.

The role of the secretary is to make notes of discussions during the learning situation. The role of the secretary has a strong importance because the notes are the physical evidence and the source for later developments and lessons. Secretary can also use a whiteboard to help in structuring and leading discussions during the learning situation.

The role of the other students during the learning situation is to actively take part in discussions and offer their opinions and knowledge of the subject in the use of the whole group. Students learn and they need to learn the art of good listening skills also.

3.2.2 Steps of learning situation in PBL

Learning situation in the method of problem based learning is logically structured (<http://www.oulu.fi/opetkeh/kehtoimi/PBL/seitsemanaskelta.html>). It consist of seven steps which are:

1. Clarifying concepts
2. Defining the problem
3. Analysing the problem and/or brainstorming
4. Problem analysis
5. Formulating learning objectives
6. Self studying
7. Reporting

These seven steps are used in two different learning situations. During the first learning situation steps 1-5 are used and during the second session the last step –reporting- is being handled. The following picture describes the idea of seven steps.

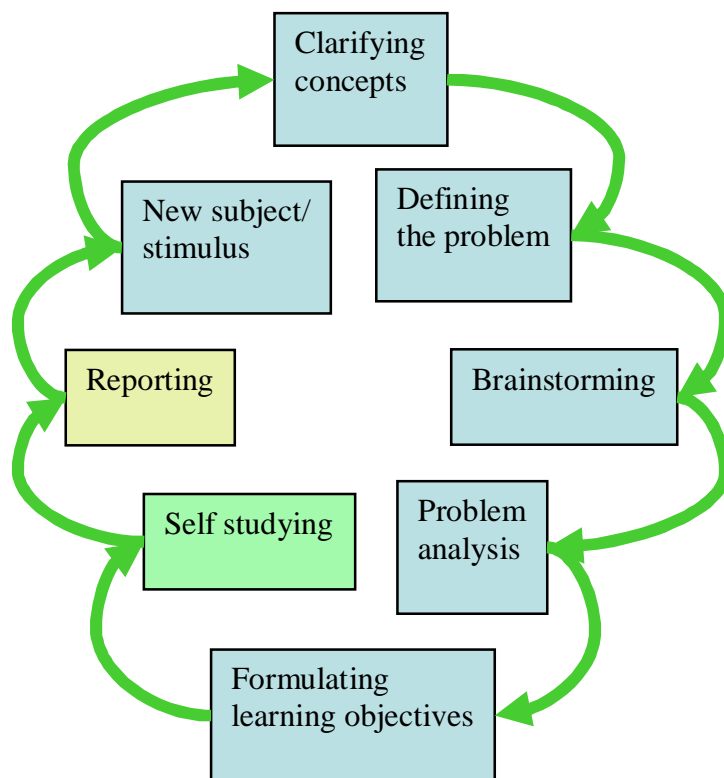


Figure 4. After the given stimulus problem based learning consist of seven steps.

After given the stimulus PBL lessons starts with the step “clarifying concepts”. The idea is that students will discuss shortly from different terms and concepts which belong to the actual problem or a case offered in the stimulus. This part works as a ground for the next steps.

The second phase is called defining the problem. It should not take too much time. Students define the problem according to stimulus given. This definition is the basis for brainstorming. It is very important that the tutor listens carefully and controls if necessary that students will start to solve the right problem.

Brainstorming is an open unstructured discussion forum. Each student is free and obliged to give and share their ideas. The idea is that this kind of discussion creates associations and by

that way is a fruitful way to analyse them. Students are encouraged to form different explanations, use alternative approaching methods, analyse and comment specific details and hypotheses of the given case. The idea is to list relevant things and explanations and to share knowledge and opinions with the whole group.

In analysing part students analyse results of the brainstorm. In this phase it is necessary to be analytical and critical towards the things found in the phase of brainstorming. The idea is to find cause-effect relationships between things that were found during the brainstorming. The idea is to find an explanation to the problem and even a possible solution. In this phase students will also analyse what are the missing points or question marks in their explanations. Practically in this phase the role of the secretary is very important. His/her duty is to use whiteboard or something similar to write down explanations and relationships.

Fifth and the last part of the first learning situation is the phase of formulating learning objectives. All previous steps are a base for this. As a result of this step students get their homework which is a preparation for the next learning session, the reporting phase. Learning objectives should be formulised in a clear way with carefully formulised terms and concepts. For students point of view it is relevant to find out the most important parts of the case or a problem. The tutor must control that all the relevant learning objectives have been found and if not then the tutor should guide students to find the missing relevant learning objectives.

After the fifth step students have formulated the learning objectives. The next step is to find explanations or solutions for those learning objectives. This happens in the self studying period which is the time between the two learning situations. In ideal time for this is one or two days. Students get to know the study material of the course. This material may be more or less given by the tutor. It may be relevant to encourage students to find material themselves too. It is pedagogically relevant that students need to evaluate different sources of information. During the self-studying period student may also contact the tutor to clarify things if needed.

The last step of the PBL “dance” is the reporting phase. It happens during a separate contact lesson. In the report phase each student will explain his or her findings and the group will

formulise their view to the learning subject. The target is that the students will find the solution to the original problem stated in the stimulus and the phase of defining the problem. In discussions each learning point is being handled separately. The role of the discussion leader is very important so that time is being used effectively. Students may ask tutor to clarify things when necessary. In the end each student has possibility to comment the learning case and the group work.

3.2.3 Why to use PBL in teaching?

Theoretically PBL bases on constructive learning (Poikela 2002). Constructive learning theory explains that learning is an active, constructive, cumulative and target oriented process which contains problem solving. Knowledge and skills are not automatically given by the teacher but it is necessary for student actively construct learning (Tynjälä 1999). Constructive learning is theoretically supported by cognitive psychology. In cognitive psychology each individual persons thinking, memory and other inner processes are highlighted. An individual is not an empty box but each student has his or her background in which he or she mirrors new things. This is one important fact that is also utilised in PBL.

Essential features for PBL method in education can be classified for example as follows: (Poikela 2002)

- The content of PBL education is organised more around the relevant practical problems than in traditional academic world where the content has been planned according to theoretical content of science.
- PBL promotes group working, self studying, contextual knowledge, critical thinking, lifelong learning and self-evaluation.
- Student focused learning instead of teacher focused learning.

Problem based learning is an approach to learning and teaching more than a single technique of teaching (Boud & Feletti, 2000). Students are thought in systematic and logical way to

problem solving. These are very important and typical skills that have always been necessary for engineers and will be necessary for future engineers too.

Investigations made in beginning of the new millennium support the efficiency of the methods of interactive learning in groups, community, organisation or expertise network comparing to more traditional learning process of a single learner (Poikela 2002). In PBL this efficiency is possible to apply in the classroom.

Very important base assumption of PBL is that learning happens when active and individual students solve problems independently and together, research their own thinking and things that affect to their opinions of things, investigate theories and by that way construct their individual knowledge and understanding (Boud 1985).

Engineers work in real life is very much problem oriented. Engineer needs to mirror actual problems to their theoretical background knowledge and experiences. They need to analyse current situation, define the problem or a challenge, find possible solutions, analyse these possible solutions, make a riskanalysis from different possible solutions and to decide of any actions. Engineers work is very much lifelong learning too. New technologies and new applications make it possible to create revolutionary solutions number of fields. A modern engineer can not survive in his or her work with the knowledge and skills learned in 1980s or even 1990s without absorption of steps taken in modern science. We can say that if an engineer does not know what happened yesterday then he or she can not make correct decisions today. Not only in engineers work but especially in engineers work, there should be a strong effort in lifelong learning. I think that it is very important to support this kind of learning already in engineering education for students. Learning to use this kind of learning method may be at least as valuable as learning of current advanced technological features. I believe that in this way PBL is a valuable learning method in engineering education. It is possible to use practical examples as a stimulus and steps in PBL have similarities in real engineers work.

The philosophical principle of PBL is that it is student oriented method. It gives students possibilities to be aware of their prior-knowledge regarding to the subject. Students are also

supported to be active in the learning process. They have possibilities to construct their understanding of the subject during the study period and with the help of social context which bases on pragmatism, cognitive psychology, learning of the meaning of subject and social constructivism (Silen 2002).

3.3 Implementation of Problem Based learning method in to teaching

Many institutes and faculties have a long history and traditions of certain way of working and giving lectures for students. Traditional methods may have worked well, they are fully accepted and supported. Therefore it is a big challenge to try something new and make changes. The implementation of new methods must be properly planned and executed.

It is possible to find several examples from literature how PBL method is being implemented in teaching. Poikela & Poikela have published one possibility of eight phase formula of implementing PBL in teaching Engineering (E. Poikela, S. Poikela, 2005).

- Phase 1: Find out what graduated student should be able to do, qualifications.
- Phase 2: Survey the data of the working environment, companies of the engineers.
- Phase 3: Split the data of phases 1 and 2 into circumstantial tasks.
- Phase 4: Analyze components of knowledge, skills and attitudes of each task.
- Phase 5: Classify the content.
- Phase 6: Phase the content.
- Phase 7: Pick up proper learning procedures.
- Phase 8: Design the assessment and evaluation system in general and for every task, case or problem.

Investigation of engineers “novice knowledge” is good to execute together with the business life. From there it is possible to get actual and proper information,for phase 1. The results of

this investigation should be linked to the objectives of PBL course. Companies may also offer data and cases to be used in PBL teaching, phase 2.

Splitting the data, phase 3, is possible to do by forming operational and functional objectives. It is also possible to divide course objectives into sub objectives which are then covered with actual cases or problems.

Analysing and classifying the content gives a basic structure for the course executed with PBL method, phases 4 and 5. Phasing of content means actually the schedule. What cases are used and when, phase 6. Picking up proper learning procedures for each lesson is the last fine tuning of the implementation, phase 7.

A very important part to plan properly in PBL method is the assessment. It is very often that assessment methods guide the working of students. This is natural because students are studying to get good grades. Therefore it is very important to plan assessment method that supports problem based learning, phase 8.

When implementing PBL into teaching one must accept that it is not going to be perfect right from the beginning. More likely it is going to be a continuous process to advance step by step to the better results. It is encouraging to read experiences from Lahti University of Applied Sciences where they started the implementation of PBL into engineering studies in the beginning of 2000 millennium (Lahtinen, 2005). With implementing PBL they wanted to answer to the challenge that had occurred by lack of motivation of students in late 1990's. They chose PBL as a curriculum strategy in teaching of Mechatronics Engineering already in year 2000 and first PBL students graduated already in May 2004.

In the first year of implementation problems occurred in writing case problems, in assessment and in guidance of groups. It occurred also that PBL method was not suitable for teaching mathematics and physics but it seemed to work better in professional studies. The first year was a total and aggressive learning process, almost everything had to be changed. It also occurred that operational and cognitive processes were taken into consideration, but social and reflective processes were mostly ignored.

In Lahti they have carefully analysed student feedbacks, collected experiences and made corrections in implementation of PBL as well as contents of courses. In the near future they are going to continue the progress of PBL and they are going to strengthen instructions of self-study part and the evaluation and assessment systems.

The message of implementation of PBL in Lahti University of Applied Sciences is clearly that the implementation is a continuing process. The progress should be analysed and make corrections annually. “When implementing PBL you face extensive change processes which have effect on social, organisational and individual level (Lahtinen 2005).

4. The plan of implementing PBL into Logistic Information Systems 2

4.1 Introduction to the implementation plan

Logistic Information Systems 2 is a course where PBL method may work well in practise. This just need to be properly planned as presented in previous chapter. The content of the course covers practical topics of modern logistic management information systems. It is possible and also necessary to use visiting lectures from companies to give students knowledge, experiences and views from business life. These lessons are taken by visiting lectures and naturally then PBL is not used. Still visiting lectures may offer suitable stimulus, problems or cases which can be used in PBL sessions. Also some information systems are practised during the course so this will take some time from PBL. Still an important target for using PBL is to create strong basis for the whole course with this technique. This is possible with the support of motivated students who have chosen the area of telematics as their specialisation area of their professional studies.

In planning the implementation following contents are being considered:

- Background
 - Facilities
 - Scheduling
- Practical issues
 - Introduction of PBL for students
 - Problems or cases
 - Reporting
 - Other requirements from students
 - Feedback and utilisation of feedback
 - Evaluation of the course

4.2 Implementation plan for facilities

Normally physical facilities, such as a classroom, remains the same during the whole course. This is natural because we have limited amount of classrooms in the campus area and scheduling is done normally for the whole semester. For the Logistic Information Systems 2 course we have used always the computer class because in some parts of the course we train logistic management information systems in practise. When using PBL as a method of teaching I think that a computer class is not suitable. It is maybe the most unsuitable choice for this purpose. It is extremely important that we get a normal class room for the period of PBL. Therefore I need to plan early in advance the schedule and make reservations for normal classroom during PBL period.

As a virtual learning facility we have a possibility to use Generation R5 as a tool. We will use R5 for the following purposes during the course:

- ü Information of practical things during the course
- ü Distribution channel for learning materials
- ü Discussion possibilities for students in between contact lessons

Information of practical things means the document of weekly schedule of the course as well as documents of course description and participants. Also topical news regarding the course are being informed using R5 environment. All learning material in the course will be delivered using R5, such as lecturing materials from lectures, all cases, problems or projects that are given for students to solve. An important feature that I am going to use next autumn especially for purpose of PBL is the discussion channel. I will encourage students to use R5:s discussion channel to share their opinions with each others and teachers in between contact lessons.

Scheduling of the course is also extremely important. First of all it is necessary to have four hours of lessons during the week. This should be divided so that the first two lessons in the beginning of the week, either on Monday or on Tuesday and the last two lessons in the end of the week, either on Thursday or on Friday. This way we create periodical facilities most

suitable for the use of PBL method. Weekly schedule of the course should be clear and logical. This is very important because the course have three main phases: visiting lectures, trainings of information systems and PBL lessons. Students have criticised that the content has been a bit confusing. I put a lot efforts in the beginning of the course to explain to the students the targets, requirements and especially the way of working. I hope to be able to divide these three different methods of working into three clear periods. It is logical that first phase could be visiting lectures to give students views from practical life as well as hopefully sources for stimulus, problems or cases. After that the main content of the course with PBL method would follow. The last period would cover trainings of information systems in practise. Idea of weekly schedule for the new developed course is presented in appendix 2 (p. 32).

4.3 Implementation plan for practical issues

Introduction of PBL for students will happen during the first lessons of the course. The idea of the first lesson about 45 minutes is to explain students the aim of the course, requirements, weekly schedule and working methods. The second lesson will contain the theory of problem based learning. It is very important because this is the first course in the faculty of Logistics where PBL is going to be used. I will explain students carefully the idea of seven steps and meaning of different roles in this technique. Together with students we will also decide rotation of roles in the schedule so that everyone knows early in advance his or hers role in each lesson.

Problems, cases or other stimulus are in crucial role in problem based learning. My idea is to use as much as possible cases from practical life in companies. The aim is to combine theoretical knowledge into practical cases. The work to search these cases is already going on. I also hope to find cases from our visiting lectures in the beginning of the course. I will write cases so that in addition to the practical challenge or problem students are also forced to clarify theoretical descriptions and other contents of the case.

The requirements that are needed and asked from students will be a written report from each case or problem. Reporting will be done in pairs. This means that during each PBL case students will work in pairs. There will be totally 5-6 PBL cases. The assessment of the Logistic management systems 2 course will be done according to these reports and also according to students' activity during different parts of the course. In addition to this there will be one exam for the module of Logistic Information Systems. My idea is that maximum points of the course is 200 which consists of 100 points from PBL cases, 50 points from the activity of students and 50 points from the exam. The idea of assessment is described in the picture 5 below.

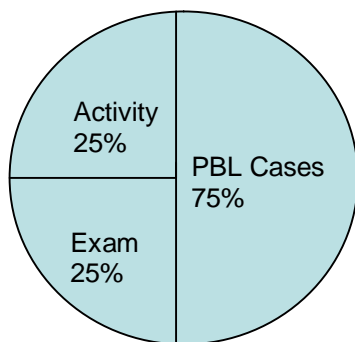


Figure 5. Assessment of Logistic Information systems 2

It is very interesting to collect feedback of this course. I will collect first official feedback in about half way of the course and in the end of the course I will collect the second official feedback. Normally feedback covers the whole module of Logistic Information Systems but next autumn I will in addition collect specific feedback regarding the course Logistic Information Systems 2. Feedback will be carefully analysed and used for developing the course. As experiences from Lahti University of Applied Sciences shows it is very natural that the new method of teaching is not ready right away from the beginning.

5. Conclusion

This development work has been very useful. I am still in my early years of teaching career but I have already noticed that strategic change to the work of the teacher is not at all a simple task. It seems to me that in our faculty each teacher has his or her own style and strategy to teach which is natural. Development happens semester after semester according to feedback from students and according to things learned by teacher him- or herself. Still the basic strategy of teaching often remains the same.

We have some common guidelines that teachers respect in their work. We are very much focused on the business life and we absorb ideas and things from companies. In many courses there are also project works for companies. This co-operation with business life supports the idea of Problem Based Learning very well.

This report does not describe the results of implementation and therefore not also the first feedback of the course. These things will be analysed carefully during the winter time 2007-2008.

This time I will implement the whole new method to my work as a teacher. Problem based learning method has been used in many institutes already more than 20 years but in our faculty we have not yet tried this technique. Therefore this project is an interesting challenge. It is useful and sensible to try new techniques. The worst case is that I find out that this technique does not suit at all for teaching of Logistic Information Systems 2 or to my style as a teacher. Even in this case I have learned something. Another possibility is that this new method of teaching will turn out to be a success. Then it may be that I will use this technique in other courses as well. Anyway I am very enthusiastic about this project and looking forward to autumn 2007 when things happen in practise. One thing is for sure, to achieve something you need courage to make moves and actions. Development does not happen if everybody stays in his or her cube, to achieve development we need to step out from our own individual convenient area. This development work has forced and supported me to step out from my own convenient area. Already during the planning work I have got variety of new ideas and learned a lot. Very important is that I have developed myself so that I want to learn

more and try new methods of teaching. This brings joy to work and life in general too. I am positively looking forward to the autumn 2007 and to future after that.

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Illinois Mathematics and Science Academy in USA
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Queens University of Kingston Ontario in Canada
(<http://meds.queensu.ca/medicine/pbl/pblhome.htm>)

Maastricht University in the Netherlands (<http://www.unimaas.nl/pbl>)

University of Medicine in Linköping Sweden
(<http://www.liu.se/utbildning/programinfo/om/pbl.html>)

Appendices

Appendix 1: Weekly plan, spring 2007

VIKKOSUUNNITELMA

Opintojakso: TLTI1650 Ohjausjärjestelmät, Logistiikan tietojärjestelmät 2
 Laajuus: 4 opintopistettä
 Lukukausi: 7K
 Opettaja: Tommi Franssila, Adrian Czech
 Ryhmä: TLO5K

Opetus tapahtuu maanantaisin kello 13:30-15 ja torstaisin kello 8:15-10 opetustilassa F204
 Arviointi: Max 400 p = tentti 200 p + harjoitustyöt 150 p + aktiivisuus 50 p; läsnäolo 70 %

Lähi Etä

Vko	Opetus- tunnit Suun/tot	Muut opisk. teht. Suun/tot	Suunniteltu sisältö/ toteutunut sisältö	Opettaja
3	2/	2/	Opintojakson esittely	frato
4	4/	4/	Johdanto, prosessijohtaminen	frato
5	4/	4/	Toiminnanohjaus	frato
6	4/	4/	ILS	valma, Kari Mäki
7	4/	4/	ILS	valma, lempa
8	4 /	4/	SAP	frato, czhad
9			Hiihtoloma	
10	4/	4/	SAP	frato, czhad
11	4/	4/	SAP	frato, czhad
12	4/	4/	SAP	frato, czhad
13	4/	4/	SAP	czhad, frato
14	2/	4/	Dokumentaation hallinta	frato/vierailuopettaja
15	2/	4/	Asiakkuudenhallinta, PDM johdanto	frato
16	4/	4/	PDM yritysvierailu Metsolla ma 16.4. klo 13:30-	frato
17	4/	4/	Tentti 23.4, palautus	frato
Summa	50/	54/	Opiskelijoiden yleistyytyv. kysymyksen keskiarvo/	

Appendix 2: New developed weekly plan

Weekly Plan

Course: TLTI1650 Logistic Information Systems 2
 Extent: 4 ECTS
 Semester: 8S
 Teacher: Tommi Franssila
 Student group: TLO5S

Contact lessons 4 hours/week, 2 X 2 hours

Assesment: Max 200 p = PBL cases 100 p + Activity 50 p + Exam 50 p

Week	Contact lessons	Other tasks	Planned Content	Teacher
36	2/	2/	Introduction to the course and PBL	frato
37	4/	4/	Visiting lectures	frato
38	4/	4/	Visiting lectures	frato
39	4/	4/	Visting lectures + company visit	frato
40	4/	4/	PBL	frato
41	4 /	4/	PBL	frato
42			Holliday	
43	4/	4/	PBL	frato
44	4/	4/	PBL	frato
45	4/	4/	PBL	frato
46	4/	4/	PBL	frato
47	4/	4/	Trainings	frato
48	4/	4/	Trainings	frato
49	4/	4/	Trainings	frato
50	4/	4/	Exam + final meeting	frato
Total	54/	54/	Feedback	