Teaching Portfolio

Johan Marklund
Associate Professor of Production Management
Head of Department, Industrial Management and Logistics
Lund University, Faculty of Engineering

January 2010
Table of Contents

1. Introduction ........................................................................................................................................... 1
2. Teaching philosophy .................................................................................................................................. 1
3. Short Biography with respect to my teaching career .................................................................................. 3
4. Examples from my teaching practice – illustration and reflection .............................................................. 4
   4.1 Case 1: Teaching Quality Management at Leeds School of Business .................................................... 5
   4.2 Case 2: Business Process Design and Simulation at Leeds School of Business ................................. 6
   4.3 Case 3: Experiential Learning in Production and Inventory Management at LTH .............................. 7
   4.4 Case 4: Development of case oriented computer lab exercises for learning simulation modeling .......... 9
5. Sharing teaching experiences and pedagogical ideas with others .................................................................. 10
6. Challenges and goals for the future ........................................................................................................... 11
References .................................................................................................................................................. 11

Appendix A - Evidence to support Case 1: Teaching Quality Management at Leeds School of Business

Appendix B - Evidence to support Case 2: Business Process Design and Simulation at Leeds School of Business

Appendix C - Evidence to support Case 3: Experiential Learning in Production and Inventory Management at LTH

Appendix D - Evidence to support Case 4: Development of case oriented computer lab exercises for learning simulation modeling

Appendix E - Published conference papers
1. Introduction

The purpose with this portfolio is to describe important aspects of my teaching career and my achievements as a teacher, but also to reflect on my role as an educator, and my approach to teaching in the quest for improved student learning. The portfolio should be viewed as a complement to my CV, and the ambition is that together these two documents should provide a good description of the breadth and depth of my experience as an educator.

I have structured this document in the following way. In Section 2, I discuss the basic ideas that guide my approach to teaching. The combination of these ideas defines my teaching philosophy. Section 3 provides a short biography with respect to my teaching career. I briefly describe the extent of my teaching experience and how I have developed as a teacher over time. I also summarize the pedagogical training I have acquired outside the classroom. More details about these things are available in my CV. The main focus of the portfolio is placed on Section 4, where I describe and reflect on some important examples from my teaching practice. In Section 5 I describe how I have shared my pedagogical experiences as a teacher with others. Finally, Section 6 concludes with some thoughts and aspirations for the future.

2. Teaching philosophy

It would not be fair to say that I subscribe to a single outspoken teaching philosophy. Instead I have some basic ideas and beliefs that guide my approach to teaching and my interactions with students. These ideas and beliefs are based on thorough reflection and analysis of my experiences acquired in the classroom, and from designing courses and course material. They are also a product of the pedagogical training I have received, of the pedagogical literature I have read, and of the ongoing discussion with colleagues about teaching related matters. It follows that as my experiences change, and my pedagogical expertise evolve over time, so does my approach to teaching. Still, there are some underlying ideas that have remained, and that have been reinforced over the years. I consider these to be the foundation for my continuously evolving teaching philosophy. One such core idea is the importance of “learning by doing” as a means to internalize knowledge, to really understand a subject, and thereby make it meaningful. Dewey (1938) characterize “learning by doing” as a process where the student should: (i) encounter a problem, (ii) face difficulties, (iii) gather facts to be used for solving the problem, (iv) assess in what direction a solution may be found, (v) formulate hypotheses based on known facts, (vi) construct theories, and (vii) practice to experimentally verify hypotheses and theories. Although desirable, this ambiguous definition of “learning by doing” may in my experience be difficult to achieve, especially in more basic courses. Hence, in my pragmatic interpretation, “learning by doing” means to in some way apply the factual knowledge, concepts, theories, and methods that are being presented in a course, in a meaningful context. In my own teaching practice this means frequent use of exercises, projects, games, cases, discussions, experiments etc. to complement traditional lectures. In some cases these activities will achieve Dewey’s definition, but in other cases only some of the seven process steps above will be covered.

My belief in hands-on application as an important part of the learning process also means that I find theories concerning Experiential Learning (see for example Lewin (1951) and Kolb (1984)) very relevant to my deed and as a teacher. I particularly find the experiential learning cycle conceptually appealing. Figure 1 displays the four phases in Kolb’s learning cycle from Kolb (1984) (a similar learning cycle is available in Lewin (1951)). According to Kolb, learning can begin in any of the four phases (Concrete experience, Reflective observation, Abstract conceptualization, Active experimentation), but effective learning requires that the cycle be completed. I cannot say that I always manage to close the experiential learning cycle in the way Kolb (or Lewin) describes it, but I try to design my courses so that there is room for all four learning phases. I believe this is an important way to stimulate the students to deep learning approaches, see, for example, Biggs (2003). To illustrate my pragmatic interpretation of the experiential learning cycle (see Figure 1) we can consider an exercise where a group of students are faced with a production process that is in need of analysis and improvement. A concrete experience of the real production process is often hard to achieve, but experience of the current process and its performance can be made concrete by a realistic description combined with simulation (either a computer based model or a physical model/game). From the
description and simulation, *observations* can be made about the process performance, and by asking relevant questions *reflection* regarding this performance, and what causes it, may be stimulated. With an understanding of the current process and its weaknesses, questions regarding how to improve the process, using the concepts, theories, and methods discussed in the course, require *abstract conceptualization* by the students in order to arrive at relevant improvement suggestions. Discussing different approaches, and motivating them to each other within the student group, enhances the understanding and broadens the students’ perspectives. The solution alternatives may then be tested by *active experimentation* using simulation. The obtained results provide a new *concrete experience* etc.

![Diagram of the four stage learning cycle by Kolb (1984)](image)

*Figure 1 The four stage learning cycle by Kolb (1984)*

Another basic notion that underpins my approach to teaching is that I strongly believe that as a teacher, I have an obligation to display a genuine interest in the students, and to show that I want them to learn. This can be conveyed by a constant interest in their opinions and feedback, but also by making me available for the students to ask questions and discuss issues they have with the class. The teacher immediacy, I believe, is very important in order to reach the students and stimulate their interest for the subject. Of course, there are limits to how much of an open door policy is feasible. However, to meet students with a positive attitude and empathy when they seek help usually goes a long way.

As for my role as a teacher, time and experience have taught me that there is no universal formula for being a good teacher. Each person has his or her own style, the same way that persons learn in different ways, and I think it is important to recognize this. As a result, I believe that in order to be a successful teacher you need to be able to go outside your comfort zone and adjust the teaching approach to the cultural environment and the students you teach. To be able to do this in a good way, you must first understand what the students expect and desires. This does not mean that I believe one should lower the academic standards to please some student groups, quite the contrary. The key in my view is to be flexible enough to avoid discouraging students because of the format in which a course is given, or because of the way you explain and illustrate the subject. A concrete issue in this respect is to understand the students’ frames of reference. As I teach courses in production/operations management and many students today have never set foot in a manufacturing plant. It becomes important to illustrate principles and concepts in a context to which the students can relate, for example, by translating industrial processes into everyday life situations. At the same time it is important not to loose the industrial context, because it is important for the students’ motivation to relate the theory to relevant practical situations and future job situations. From a theoretical point of view, see for example Chapter 4 in Biggs (2003), one can argue that the practical relevance enforces both the extrinsic motivation for students that are very focused on their future careers, and the intrinsic motivation for those who are genuinely interested in production/operations management as a subject. Finding a balance between the industrial context and the students’ frames of reference can be quite challenging, and it is something I continuously work with. To succeed, I think one has to have the courage to try new things and accept that not all good ideas work in all environments. My own comfort zone and cultural background is in the traditional lecture format, but I have forced myself to try other approaches, some of which have been more successful than others. However, I have learned a lot also from my mistakes, maybe even more so than from my successes. Most importantly, I believe I am a much better teacher for it.
3. Short Biography with respect to my teaching career

My first real teaching experience dates back to 1989 when I did my military service as a medic in the Swedish Army. After my own training, I got several assignments to teach other soldier groups about emergency care and first aid. I also assisted my commanding officer in training volunteers from the Red Cross. I cannot say that I enjoyed my military service that much, but it did give me a taste for teaching that still lasts, and the flavor is growing richer by the years.

My teaching career at the university level started in 1991 while I was still a MS-student in Industrial Engineering at Linköping Institute of Technology, and by now it spans 19 years at three different Universities and four different departments:

- The Department of Mathematics, Linköping Institute of Technology (LiTH), 1991-1994,
- The Department of Industrial Engineering (IE), Lund University, Faculty of Engineering (LTH) 1994-2000
- Leeds School of Business, University of Colorado at Boulder, USA (LSB), 2001-2005
- The Department of Industrial Management and Logistics (IML), Lund University, Faculty of Engineering, 2005-

In terms of subject areas, my experience includes courses in mathematics, managerial economics, accounting, production and inventory management, operations research, quality management, process design, and simulation modeling. In total I have taught 16 different courses (1-4 times each), and supervised numerous master thesis projects. In 8 of the 16 courses I have been responsible for the entire course, in 4 of the remaining 8 I have been responsible for sections of the course (including lectures and examination), in the last 4, which all date back to my early years as a part time teacher at LiTH, I only held seminars and exercise sessions in computer labs. In all courses where my responsibilities have gone beyond being a part time teaching assistant, I have actively developed different types of course material including compendia, teaching cases, project assignments, exercises, power point presentations etc. In one case it has also led to the writing of a textbook together with Professor Manuel Laguna at University of Colorado. The book is titled “Business Process Modeling, Simulation and Design” and was published by Pearson Prentice Hall 2005 (Laguna, Marklund (2005)). In addition to the book itself (427 pages) we also developed a detailed instructor’s manual with suggested curriculums, power point presentations and solutions to all exercises and projects. In terms of different student groups and levels, I have taught all levels of Swedish engineering students (in Swedish and English), and US business students on undergraduate, MBA and doctoral levels (in English). Moreover, I have been the assistant supervisor for two PhD students that have graduated, and I am currently the main supervisor for two PhD students, and assistant supervisor for two others.

Apart from my teaching experience in the classroom, I have in later years also been involved in coordinating teaching activities and courses on departmental and program levels. This in the capacity of faculty representative in the steering committee for the Industrial Engineering and Management (I) program at LiTH (2006-2008), as chair of the Division of Production Management and deputy head of the department of Industrial Management and Logistics (2007-2009), and as head of department for Industrial Management and Logistics (2010-).

Reflecting on my development as a teacher over time, I think it has been a very interesting journey. In a way it starts and ends with a student centered focus on teaching. To elaborate, I began teaching when I was still a student myself and my teaching assignments were to hold seminars and exercise sessions for small groups of students. This meant a lot of interaction with individual students helping them to understand mathematical concepts and how to solve problems. In this type of one-to-one tutoring situations it was (and still is) natural to ask the student how he or she was thinking, and based on their current understanding and frame of reference I tried to help them to a better understanding. If they did not get my explanations they told me so, and I could try a different explanation until he or she understood. I found (and still find) this intimate teaching situation very rewarding and very similar to when I worked with my friends and explained things for them. I also began to realize that one of the best ways to really learn something is to explain it to someone else.

When I started my PhD studies and moved to LiTH my teaching responsibilities quickly changed to lecturing for larger groups of students, i.e., a one-to-many teaching situation. Initially, I found this rather frustrating because I could not tailor my explanations to each individual student, and I got very little feedback about how successful I was in helping them with their learning and understanding of the subject. For a few years, I think it is fair to say that I shifted my focus from the student to making sure I
delivered the best possible presentation of the material. However, successively, as I got more used to the one-to-many teaching situation and also became responsible for entire courses, I began to focus less on lecturing/presentation and more on the course structure and how different activities in the course (lectures, exercises, practice cases, guest lecturers etc.) together make the course attractive for students and help them to learn. I have later come to realize that this resonance well with the observations in Kugel (1993) regarding how university professors tend to develop.

In retrospect, I can say that my approach to teaching has become more and more influenced by a belief that "learning by doing" is key to really understanding a subject, and to stimulate learning. In my case this means that my approach to teaching is characterized by frequent use of examples, exercises, and practice cases where the students work together to solve problems or to apply tools and concepts. I think that working together, explaining to one another, and jointly arrive at solutions stimulate learning and understanding. In the best of worlds this means that the students learn more from each other than from me as a teacher. In the courses I teach I try to make sure there are resources available to facilitate one-to-one teaching situations, both between students in group work, and between the students and teachers (myself or others). In addition to structuring the courses to include different types of learning environments, with the ambition to activate students and complement the one-to-many lecturing situation, I try to activate students during lectures. Depending on the subject I have worked with discussion cases, games, and problem solving exercises, again influenced by my belief in learning by doing and hands-on applications, as described in Section 2.

My development as a teacher over time is of course influenced by my experiences in the classroom but it has also been influenced by the pedagogical training courses I have attended over the last 15 years. To date I have participated in 10 pedagogical training courses at the Boston Consulting Group (1), University of Colorado (3), and Lund University (6). Brief descriptions of these courses are available in my CV together with web addresses where more information can be found.

4. Examples from my teaching practice – illustration and reflection

In this section, I will provide some concrete examples from my teaching practice that have been important for my development as an educator. I will focus on four cases, directly related to four different courses, and I will reflect on how these cases are aligned with my teaching philosophy. The cases are collected from 2001-2009 and are presented more or less in chronological order. Case 1 and Case 2 stems from my time as an Assistant Professor in Operations Management at Leeds school of Business, University of Colorado, Case 3 and Case 4 from my tenure at LTH. Case 1 focuses on a course in Total Quality Management and describes how I adopted my teaching approach to better match the expectations of US business students. The changes were brought on by an urgent need to improve the course. Case 2 focuses on a course in Business Process Design where a desire to combine hands-on use of discrete event simulation modeling with process design led to the writing of a new textbook, Laguna and Marklund (2005). It also describes a successful approach to use humor in teaching. This change was inspired by a pedagogical training course I attended, and it was later documented and published in Marklund (2009). Case 3 focuses on an advanced course in Management of production and inventory systems where I have used group assignments, discrete event simulation and industry based projects to achieve an experiential learning environment, and to facilitate completion of Kolb’s learning cycle. An investigation of the results is available in Lundin and Marklund (2008). Finally, Case 4 focus on a Basic course in Operations Research, where I together with a colleague developed a new series of computer lab exercises in discrete event simulation. The purpose of the new assignments are to better support all phases of Kolb’s learning cycle and thereby stimulate deep learning approaches and construction of interconnected knowledge. This work was also inspired by a pedagogical training course, and it is thoroughly described in Marklund and Olsson (2009).

Using the assessment framework in Antman and Olsson (2007), I view Case 1 as an illustration of an early more atomistic and un-reflected approach to teaching and learning, while Case 2, Case 3 and Case 4 represents more holistic and reflected/scholarly approaches.
4.1 Case 1: Teaching Quality Management at Leeds School of Business

In the fall of 2001 I started a new position as Assistant Professor of Operations Management at Leeds School of Business, University of Colorado, in Boulder, USA. My first teaching responsibility was an undergraduate course in Total Quality Management (TQM), with about 50 students. The challenge facing me, apart from teaching in English for the first time, was a completely new student group consisting of 2nd to 4th year US business students. This was also the first course with a non-quantitative focus that I had taught. To complicate things further I arrived 5 weeks into the semester because of the 9/11 terrorist attacks, and misplaced work permits by the US immigration authorities. This meant that a colleague covered for me the first 5 weeks of the semester and I stepped into the classroom the day after I arrived. I had prepared very carefully for the course during the summer and I was confident that it would work out quite well. I felt I had quite a lot of teaching experience and I was used to receiving good course evaluations. Without going into painful details the course was a disaster. Partly because of the circumstances (the students were for example very upset to change teacher 5 weeks into the course), but the main reason for the debacle was a complete clash of cultures. The expectations of US business students concerning lecture format and the workload are very different from Swedish engineering students. In brief one can say that the US business students expect much more variation, interaction and discussion during lectures, and a considerable lighter workload. Comments I often heard from students were that a good lecture should be fun, and with a minimum of preparation everything presented should be immediately understood by all the students. In many ways the culture is more high school like with mandatory activities, homework, several exams and a relative grading system based on many inputs (e.g., class participation, homework, term projects and small exams). For the following semesters that I taught the course I worked very hard to understand the students’ expectations and to change my teaching approach accordingly.

To illustrate how I worked to gain a better understanding of the students’ expectations and to improve the course, I would like to mention one approach which worked well in this class, namely in class quality circles. The quality circle is one of the famous tools used in quality improvement programs to generate ideas and encourage continuous process improvements. The basic principle is to form small groups of people working in the process, called quality circles. These quality circles meet regularly and through discussion and brainstorming, the group should reach consensus on the most pertinent issues to improve, and on suggestions for how this could be done. Management gets the feedback from the quality circles, decides on what ideas to implement, and informs the respective quality circle about the changes. An important feature in order to perpetuate continuous improvement and to facilitate evaluations of implemented changes is that the quality circles are held regularly. I applied these ideas in the TQM classes, where the process to improve, with the students as key participants, is the process of them learning TQM. I regularly (3-4 times during a semester) devoted lecture time where the students formed groups (quality circles) and discussed the course and how it could be improved. The group needed to reach consensus regarding at most three improvement ideas. Each group then presented their ideas to me and the rest of the class. This way the students got hands-on experience of using quality circles in a context they could relate to. The students appreciated the interactive format and they felt more involved in the course. It also provided me with invaluable information about how to improve the course and to better meet the students’ expectations. Of course, sometimes improvement ideas came up, which were impossible to implement, or which I did not want to implement. However, just as in real life industry applications I, the manager, then had to explain why the improvement ideas would not be implemented.

Through the quality circles and by talking to students and colleagues, I soon realized that the students expected more variation in teaching activities during the lectures than I was used to. Eventually I found a format that worked quite well. Around a backbone of regular lectures based on PowerPoint presentations, available for the students on the course web site, I worked with small case studies and in class discussion cases, video showings, guest lectures, individual homework, group homework, in class problem solving, and multiple exams. For illustration, Appendix A contains a course syllabus and lecture plan for the course.

To further illustrate how I adopted my teaching approach to the cultural circumstances I would like to describe how I worked with the above mentioned discussion cases. The purpose with introducing these in the first place was to activate the students, to have them apply concepts we had discussed in the course and explain these to each other. In my initial attempt to introduce this activity I handed out
copies of one or two articles dealing with a specific topic, for example, "Quality in Education". I then announced in class and on the schedule that we would devote time on the coming lecture to discuss what the articles say in the matter, first in groups and then jointly for the entire class. At the next lecture I divided the class into groups. I handed out some discussion questions and waited in anticipation for the discussion to take off. Nothing happened; the only topic discussed was weekend plans. Disappointed, I asked the students how many of them had read the articles, and as I suspected only a few raised their hands. I tried this several times with the same result, despite my urges for them to read the material. The next time I taught the course, I decided to try a different approach. Together with the articles I handed out two sets of questions, about five rather detailed questions but with short answers, and then about five discussion questions with open ended answers. The short questions should be turned into me before the lecture where the discussion was to take place. Failure to do so had a negative impact on the student's grade with respect to class participation. In order to answer the short questions it was necessary to read the paper rather carefully. The new approach turned out to be very successful. Essentially all students read the articles and came well prepared to the discussions, which were quite lively.

Reflecting on my experiences of teaching TQM there are a few things that stand out: (i) the importance of understanding student expectations, (ii) the use of quality circles to continuously improve, (iii) the use of discussion cases, in class games and problem solving, quality circles, small case studies, group homework and individual homework to facilitate a "learning by doing" environment, (iv) the importance of adopting your teaching approach to new circumstances.

As I worked a lot with this course over several years it was rewarding to see that my efforts were appreciated by the students. I perceived a much better classroom climate, and much more interaction and active participation from the students. This was also reflected in the official course evaluations, FCQ (Faculty Course Questionnaire), which overall improved from C's to B's, see Appendix A.

4.2 Case 2: Business Process Design and Simulation at Leeds School of Business

The second course I taught at the Leeds School of Business was a quantitatively oriented undergraduate course in Business Process Design (BPD). When designing this course, my former colleague Manuel Laguna and I felt that an important part of this course should be for the students to work hands-on with commercial simulation software for discrete event simulation. The reason for this was fourfold: (1) the new generation of user friendly simulation software with graphical interfaces makes simulation a viable tool for process analysis, also for (business) students with limited background in mathematics and computer programming, (2) having basic knowledge of simulation modeling in commercial software is something the students directly can add to their CV. This creates extrinsic motivating for many students with a focus on their future job opportunities, (3) building simulation models of processes enhances the conceptual understanding of how processes are comprised of different tasks and how decisions regarding these tasks effects the process performance, (4) working hands-on with simulation modeling offers great opportunities for an experiential learning environment for process design.

Because no suitable course book was available, we compiled our own course material, which eventually led to the writing of a new textbook titled "Business Process Modeling, Simulation and Design". The book was published by Prentice Hall in the spring of 2004; see Appendix B for preface and table of contents. The book can be described as a hybrid between traditional books in process management, operations management and simulation, which from a subject perspective represents a new pedagogical approach. A special characteristic is the emphasis on the hands-on use of the simulation software Extend.

When teaching the BPD course, I initially faced similar issues with misaligned student expectations as with the Total Quality Management course discussed in Case 1 above. However, after having taught the course two times with significant changes made based on student feedback I felt in 2002 that I had found a good format for the course. It consisted of interactive lectures oriented around a large number of smaller problems or cases. A typical lecture would alternate between presentation and discussion of concepts, theories, and methods, and problem solving examples where the class and I together applied this, and previously covered material, to analyze and solve the problems. The simulation modeling part took place in the computer lab and via a semester project. Homework, video
showings, and guest lecturers were part of the course format as well. To illustrate the scope of the course curriculum, the course syllabus and lecture plan from the fall of 2004 is included in Appendix B.

Even though I was quite happy with the course format, I was not as happy with the overall level of student interaction and active participation during the lectures. Hence, I felt a need to do something about this. At the same time, I attended a pedagogical training course organized by the University of Colorado Faculty Teaching Excellence Program (FTEP). The course was titled “Performance in a nutshell” and among other things emphasized the importance of grabbing the students’ attention at the beginning of a lecture. One way to do this that we discussed in the course was the use of humor. I found this quite interesting and decided to try and implement these ideas in the BPD course the next time I taught it. The approach I chose was to start every lecture with a small joke. My hope was that it would help to create a more relaxed and fun classroom climate that would lead to more interaction and a better learning experience for the students. I thought long and hard on what jokes to use. I wanted them to be short and to follow some sort of theme that I could motivate for the students. I decided to build on my Swedish heritage, and use goofy Norway jokes, unrelated to the course content. I framed the jokes as a cultural outlook illustrating the love-hate relationship between Swedes and Norwegians. I was careful to point out that Norwegians tell the same jokes about Swedes, and the relationship is similar to when siblings make fun of one another and quarrel in a loving way. To further emphasize this, I occasionally told the jokes from a Norwegian perspective, meaning that the rather stupid goofy character in the joke was a Swede instead of a Norwegian. I was also careful to choose jokes that were not distasteful, offensive or demeaning in any way. The “joke starting” strategy was immediately very well received by the students, and encouraged by this I continued to joke start every lecture in the course. My perception at the time was that the classroom climate and the level of interaction indeed improved. This was also supported by the course evaluations (PCQ’s), which improved considerably in 2003 compared to 2002 (see Appendix B).

Apart from the joke starting strategy, the only other change to the course format in 2003 was the involvement of an FTEP consultant, which on my request attended and videotaped one lecture. He also administered a course evaluation form and interviewed the students. The results from this course evaluation are provided in Appendix B as evidence that the students indeed were quite happy with the course. Even though the FTEP consultant was only in the class for one lecture he told me beforehand that most likely his mere presence would have a positive effect on the course evaluations. Nevertheless, I was very happy with the impact of the joke starting strategy, and I used it also the fall of 2004 when I taught the course for the last time. When later attending the pedagogical training course “The good lecture” at LTH in 2009, I started to reflect on my experiences with the joke starting strategy. I went back to analyze the data I had saved regarding course evaluations and grade distributions. I also took a closer look on the literature on using humor in teaching. The analysis and the results are thoroughly explained in Marklund (2009). In brief, the investigation shows that a small joke may go a long way to improve classroom climate, teacher immediacy, and students’ learning. As background material Appendix B contains the PCQs for the fall of 2002, 2003 and 2004.

4.3 Case 3: Experiential Learning in Production and Inventory Management at LTH

After returning to LTH in 2005, I took over the course responsibility and restructured the advanced course MIO 331 Management of production and inventory systems. In its new form, the course, which covers 9 hp and spans an entire semester, consists of three integrated sections: (1) Methods and principles for effective project management (taught by a colleague at the division), (2) Advanced methods for control of production and inventory systems (taught by me until 2008, last year a colleague taught it using my material), and (3) A live company based project in the area of production management and logistics (supervised by me and two colleagues, I am also responsible for company contacts and finding the projects). Essentially half of the course is devoted to the company based project, 1/3 to section 2, and 1/6 to section 1. For details about the course contents I refer to the course syllabus and the lecture plan available in Appendix C. My main development effort, which is what I would like to focus on in this section, was devoted to section 2, which had not been part of the course before. My goal with this new section was to deepen the students’ knowledge and understanding of quantitative methods for management of production and inventory systems, both from a theoretical and
applied perspective. An important aspect was to enhance the students’ ability to structure and solve loosely defined problems similar to what you find in real life situations. Relating this to the SOLO taxonomy, see Biggs (2003), the aim is for the highest levels of cognitive complexity, the relational and extended abstract levels. The problem was how to achieve these goals? The approach I decided to use is described below, but the two main elements are to use large group assignments for examination, and to design these assignments so that they will facilitate an experiential learning experience, taking the students through Kolb’s learning cycle.

One issue to consider is that solving larger production and inventory control problems with real life flavor using advanced methods requires the use of computers. This means that a regular classroom exam is not a suitable form of examination, given the goals stated above. Instead, I decided to use large take home assignments as the form of examination for section 2. The advantage of using take home assignments is that the examination becomes an integrated part of the learning process, as opposed to simply a test of previously acquired knowledge. Each assignment is reported in the form of a detailed technical report that is turned in for grading, together with electronic files containing the underlying data analysis and computer programs. Initially, I used a mix of group assignments and assignments that the students solved individually. After feedback from the students, strongly advocating how much better the group assignments were for their learning experience I made all assignments into group projects. Removing the individual assignments clearly increased the risk of an incorrect assessment of a student’s performance. However, I felt that the apparent benefits of students learning from one another when working on these assignments in groups outweighed the assessment issues. To have a system to deal with free rider situations that may appear in some groups, I introduced a peer evaluation process. This means that a peer evaluation form, signed by all group members stating to what extent they have contributed to solving the assignment, needs to accompany each technical report. If all group members have contributed equally, they all receive the same grade on the assignment; otherwise the grades are differentiated between group members. So far there have been very few occasions where the group work has failed, and the peer evaluation process has been used for differentiating he grades. Overall, I am very satisfied with how this form of examination has worked out. The students have considered it to be very relevant and stimulating, although they tend to find it quite challenging. They have worked quite hard and the reports I received indicate that my goals with the section, translated into more specific learning outcomes in the course syllabus (see Appendix C), have been achieved. Moreover, from an assessment point of view, there have been very few occasions where the lack of individual performance indicators has been an issue in grading. Something I feared as a potential problem beforehand.

Turning to the assignments, my ambition was (and still is) that solving them should stimulate an experiential learning process, and ideally lead to a completion of the experiential learning cycle (Kolb, 1984, or alternatively Lewin 1951), see Figure 1. The question is how to do this? As the focus is on the use of advance quantitative methods for evaluation and control of production and inventory systems, it is obvious that experimentation with a real system is not an option. Moreover, what make these types of systems challenging to manage are the inherent uncertainties in process times, capacities and arrival processes. It may also be difficult within the scope of the assignments to manage a concrete experience of a real system. To circumvent these issues, I decided to use discrete event simulation models as a substitute for reality. It is noteworthy that the purpose is not to teach simulation modeling but to use the simulation models as a proxy for reality that allows experimentation and reflection. To avoid a restricting technical threshold of using the simulation tool I provide the students with model templates that are easy to adjust to the various situations they need to study. A stated prerequisite for the course is also prior experience with simulation.

In terms subject content, a characterizing feature of the analytical models for controlling complex production and inventory systems dealt with in the course is that they rely on various types of simplifying assumptions and approximations. Hence, a very important purpose with the assignments is for the students to understand the implications of these approximations in order to choose the best method for a given situation. Based on my own experience, an effective way to gain such understanding is by hands-on experimentation using simulation models. It is noteworthy that this is also in line with Dewey’s “learning by doing” definition discussed in Section 2. Another important aspect of the assignments is to compare different methods and evaluate them using simulation, to let the students reflect on the observed differences, and explain why they occur. In some cases, they are also asked to
use their understanding to suggest modifications to the existing methods to improve their performance in certain situations. Again this is well aligned with Dewey's "learning by doing" process. A concrete example of a take home assignment used in the course is available in Appendix C. To better illustrate how the assignment supports an experiential learning process, it is accompanied by a complementary Addendum (not provided to the students), which summarizes the content of the first part of the exercise and explains how its structure supports the four phases in Kolb's learning cycle.

Reflecting on my experiences of teaching the course, I put in a lot of effort in developing the material to support my pedagogical idea of fostering an experiential learning environment and completion of Kolb's learning cycle. In many ways one could say that developing the course has been an experiential learning process for me. I have had a very open dialog with the students taking the course, and I have made changes concurrently in response to their feedback. Overall I am very pleased with how it has worked out. As indicated by the CEQ, and my own operative course evaluation from 2008, available in Appendix C, the students are very satisfied with the course. I am particularly pleased with their positive assessment of section 2 and the take home assignments. It has also been a fun and challenging, experience for me personally.

The pedagogical idea to use computer based discrete event simulation models to facilitate experiential learning in operations management and logistics courses is something I find very appealing. However, it is not obvious that using this tool achieves the goal of completing Kolb's learning cycle as intended. The student feedback and course evaluations mentioned above provide encouraging indications to that effect but I felt it would be interesting to investigate this further. A possible caveat may for example be that the time invested in building and analyzing the simulation models is too extensive and clouds the focus on a better understanding of the system dynamics through experimentation and reflection. After a pedagogical seminar at the department, I discussed this with Johan Lundin, who at the time was responsible for the course MTT 091 Materials handling (G2 level), where discrete event simulation is introduced as a tool for analysis. Together we decided to investigate the issue further by administering a survey in our respective courses. The survey consisted of 13 questions pertaining to how the students' perceived that the simulation tool facilitated learning with respect to the four stages in Kolb's learning cycle. The investigation and its results are thoroughly documented in Lundin and Marklund (2008), and were presented at the 5th Pedagogical inspiration conference at LTH 2008. The results indicate that both student groups perceived simulation as a good tool to enhance their learning experience, but the more senior students in MIO 331 with prior experience of simulation tended to value the tool more.

4.4 Case 4: Development of case oriented computer lab exercises for learning simulation modeling

In the spring of 2009, I attended the pedagogical training course "Den goda övningen/laborationen" at LTH together with my colleague Fredrik Olsson. As a course project, we decided to develop a new series of case oriented exercises for learning computer based discrete event simulation modeling. Our interest in this project is grounded in a belief that computer based exercises in general, and simulation modeling in particular, offer an excellent environment for experiential learning, as defined by Kolb (1984). This is also directly related to some of the basic ideas in my teaching philosophy, see Section 2. Our purpose was to replace the current series of exercises used in the course MIO 310 Operations research, basic course offered by our department. The course has an applied focus and teaches the students techniques for deterministic optimization and stochastic modeling, including linear programming, integer programming, queuing, and discrete event simulation. From a subject perspective, the course is based on the pedagogical idea to combine and contrast the use of deterministic and stochastic modeling techniques. Too often these techniques are treated in separate courses, and the apparent benefits of combining them are left amiss. For more details about the course content, structure and learning objectives, I refer to the course syllabus and lecture plan for 2007 available in Appendix D. For a detailed description and motivation of our pedagogical approach I refer to Marklund and Olsson (2009), available in Appendix E. The mentioned series of mandatory exercises is the main activity to teach hands-on simulation modeling using the commercial software Extend. The exercises are conducted in the computer lab under supervision of teaching assistants.
Although the students have been quite satisfied with the course and the existing series of exercises, Fredrik and I both felt that there was room for improvement. Our goal with the new series of exercises was to better facilitate deep learning approaches, and creation of interconnected knowledge as described in Biggs (2003). In terms of the SOLO taxonomy our goal is for all students to reach the relational level and some to aspire on the extended abstract level. That is, for students to be able to structure the theory, understand how different building blocks are connected, and be able to use the theory to solve similar types of problems. We also expect some to go beyond that and acquire a capability to solve new problems and identify weaknesses in the existing theory. To achieve this, we wanted the new set of exercises to better train the students in a structured approach to model building and to deal with some common subject related misconceptions, and learning thresholds (see, for example, Meyer and Land (2003) for general definitions, and Marklund and Olsson (2009) for specific examples related to our course). Many of these are related to probability theory and how randomness affects queuing systems.

Our main concerns with the old exercises were their fragmented structure and narrow focus on teaching the students functionality of the software. To achieve the stated goals, our approach for the new exercises was to base them all on an overarching case to which the students can relate. The case we chose was a supermarket in dire need of operations analysis, and more efficient management of resources. This case is then analyzed incrementally through the exercise series, starting with a very simple model as a base. Complexity and realism are then added successively until a suitable model is obtained. The exercises are structured to aid the students in this stepwise analysis, where each new step (model) builds on the previous ones. Our experience is that this stepwise approach to model building is something many students struggle with. This becomes an issue later on in the course when the students are faced with rather large assignments, where a "big bang" approach to modeling has little chance of success.

The new series of exercises were used in the course for the first time in the fall of 2009 with positive results. The students were quite happy (as they were with the old series of exercises) as indicated by the CEQ report and operational course evaluation for 2009 available in Appendix D. An average grade of 4 (on a 5 grade scale with 5 being the best) for the content of the exercise series, and comments like “Givande labbar som man faktiskt lär sig något av och förstår vad man gör” tells us we are on the right track. The teaching assistants with experience from the old set of exercises were also positive to the change. We were particularly pleased with their perception that the students were better prepared for the larger assignments later in the course, manifested by the fact that less tutoring was needed in connection to those. This perception is also supported by the operative course evaluation where this time around it contained fewer comments regarding high workload and complexity with regards to the larger assignments. In addition to the positive results, we also received very valuable feedback from students and teaching assistants on how to further improve the exercises. One conclusion is for example that we need to provide a more stepwise structure for the initial exercises to guide the students better, and avoid presenting them with too much information. Information overload tends to create confusion as to what to do and where to begin. This discourages some students and increases the workload of the teaching assistants.

5. Sharing teaching experiences and pedagogical ideas with others

Sharing experiences, ideas and opinions about teaching is something I find very stimulating. Without an ongoing discussion with colleagues in the lunch room and at coffee breaks, life as a university teacher would not be the same. Finding out what others are doing, and discussing my own ideas and teaching endeavors with colleagues and friends is something that inspires me to develop. Apart from this ongoing informal sharing of experiences and reflective thoughts about teaching, I have also shared my ideas and experiences more formally with a wider audience through publications (three conference papers and one refereed textbook published by Pearson Prentice Hall), and through participation in departmental seminars on teaching, national conferences, and pedagogical training courses in Sweden and the US.

In my role as division chair, and more recently as department head, I have actively supported and participated in the seminars on teaching that we regularly organize within the department. I have also strongly encouraged the faculty to participate in pedagogical training courses and conferences on teaching. I was happy to note that on "Den 2:a Utvecklingskonferensen för Sveriges
6. Challenges and goals for the future

For the near future there is some exciting and challenging course development work to be done as a result of the Bologna process. For me personally this will primarily concern courses in production and inventory management that need restructuring. From a pedagogical perspective my goal is to build on my experiences and ideas discussed in this teaching portfolio, and develop the courses to better facilitate experiential learning and deep learning approaches, ultimately leaving the students with a richer learning experience.

If I look further into the future I think an exciting challenge will be how the quickly evolving media technology will influence and create new opportunities for teaching and learning. For example, studying complex systems in a virtual reality opens up a whole new realm of possibilities for exiting learning opportunities, not least with respect to concrete experiences, experimentation and reflection. My interest in using simulation software as a tool for facilitating experiential learning is one step in that direction, but the journey has just begun. Our future students will relate to computers and the electronic media in completely different ways than today. This is a tremendous opportunity, but also a big challenge not least for those of us who has grown up without virtual worlds, avatars and cyber space.

My new role as department head also brings a challenge to encourage and support a learning environment for the faculty in the department with respect to teaching. For example, through regular pedagogical seminars where faculty and invited speakers share discuss their teaching methods, and by continuously encourage faculty to take part in pedagogical training courses to stimulate new ideas and an ongoing discussion about teaching. I think such a learning environment is an important way to ensure student centered learning perspectives in our courses. I do believe such a learning environment already exists within our department, but there is always room for improvement and without engagement comes stagnation.

References


