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TEACHING THEORETICAL CONCEPTS TO LARGE GROUPS OF DESIGN STUDENTS USING FISH BOWL SESSIONS

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ABSTRACT

This paper describes a teaching approach developed to pass theoretical concepts to large groups (>200) of Design students. The teaching approach is brought to the students in a cluster of three integrated and parallel courses with a total study load of 400 hours (15 ECTS points) and covering a period of 5 months. The aim of this teaching approach is to maximize internalization of the theory. The cluster focuses on corporate and market oriented product development and consists of two disciplinary courses with a more theoretical signature and a design project that has a practical signature.
The layout of the course plan is based on the experiential learning model of David Kolb that integrates the cognitive and behavioral side of learning. During part of the program the two disciplinary courses synchronize with the various stages of the design project. At the appropriate times, the courses provide plenary 'Fish Bowl' meetings, in which theoretical concepts and their practical applications are discussed. We will make clear how Fish Bowl discussions enhance in-depth participation of the students regarding theoretical concepts.

Keywords: experiential learning, large group teaching, fish bowl sessions

1 INTRODUCTION

"Industrial design engineers educated at Delft University of Technology are engineers trained to work in product development. A multidisciplinary study. ID engineers learn about every aspect of product design. They have strong practical design skills, a broad technological grounding and extensive knowledge of innovation processes." (IDE Brochure, 2003). In order to achieve this, the five-year Delft curriculum consists of a practical core of six consecutive design projects spread over the first four years. Parallel to these projects there are a multitude of theoretical and practical courses covering the various disciplinary aspects of the IDE-field. In the past five years the whole curriculum has been revised with a sharper focus on project education. In the old curriculum, the theoretical and practical courses were given next to each other, in the hope that students would be able to make the connection between theory and practice by themselves. In most cases, however, students found it hard to link topics from the theory courses to the practical courses. Students found it hard to understand how the evaluation of the practical work related to the materials studied in theoretical courses.
One aim of the new curriculum was to create a better integration between theory and practice in larger clusters. The popularity of IDE in Delft -with a continuous stream of over 250 freshmen each year- provides a complicating factor. How to integrate theory and practice for these large groups of students (>200) without increasing the teaching

load? In this paper we will describe the theoretical background and the design of an integrated cluster of courses. This particular cluster focuses on Corporate & Market Oriented Product Development, dealing with theories from six domains: strategy, organization, economy, marketing, consumer behavior, and, last but not least, product design. The 400 hours of the overall study load are divided over three parallel courses of which two have theoretical signatures and the third one -a design project- has a practical signature. The design of the course plan is based on the cyclical experiential learning model of David Kolb [2]. We will illustrate that, regarding some key theoretical concepts, students go through a series of successive learning cycles during the cluster.

2 LEARNING CYCLES AND LEARNING STYLES

Since ages learning as an explicit process has been linked to educational institutions like monasteries, schools and universities. Learning in those institutions is seen as an individual process of acquiring knowledge and/or skills. Knowledge in this context refers to the development of cognitive abilities and skills refer to the development of behavior. These two, changes in cognition and changes in behavior, are according to Inkpen & Crossan [1] 'tightly intertwined' on the individual level. For the design of our course plan we made use of the experiential learning model of David Kolb [2]. This model integrates cognitive and behavioral changes and consists of four stages (see fig. 1). The four stages represent four different kinds of abilities that according to Kolb are necessary for effective learning. A learner must be able to involve himself in new and Concrete Experiences (CE) . He must be able to make Reflective Observations (RO) on these experiences. These observations must be integrated into Abstract Concepts (AC). This is followed by activities of deciding and planning for the next experiments. Finally these plans are executed (Active Experimentation AE) which leads to new Concrete Experience.

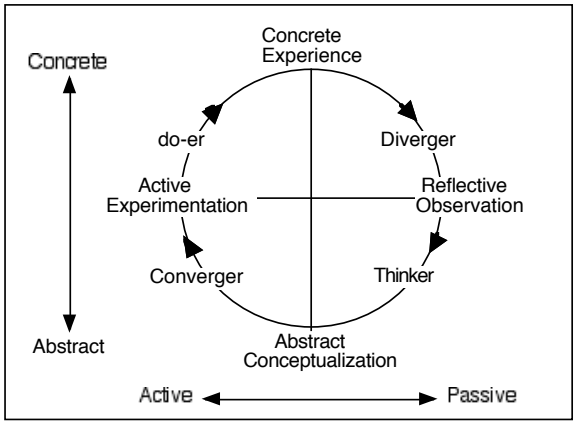

Figure 1. The experiential learning model of David Kolb (1976, 1984)

The right side of the cycle –from Concrete Experience to Abstract Conceptualization– is the process of changing the cognition regarding a certain object and or situation. The left side of the cycle –from Abstract Conceptualization to Concrete Experience– covers the active and behavioral aspects of the learning cycle. The integration of these two sub-processes is what Inkpen & Crossan [1] call integrated learning, the co-occurrence of behavioral and cognitive changes.

Although the ideal learning style consist of high skills on all four abilities, Kolb [2] points out that nobody can be gifted with this ideal style. According to Kolb most people develop learning styles that emphasize some of the four mentioned learning abilities over others. These individual learning styles are the result of the individual's hereditary equipment, life experiences and the demands of the (working) environment.
IDE-students are typically creative and focused on getting things done. They feel less attracted to the abstract world unless it is possible for them to link that world to their own concrete experiences. This makes it likely that the dominant learning styles of the majority of the IDE-students are on the concrete top half of the learning cycle.
The cluster of Corporate & Market Oriented Product Development is brought to the students in the third year, when they still lack concrete experience to reflect on. Apart from an introductory course on integrated product development in the first year and possible experiences with products and advertising in their normal life the students have no other experiences with relevant issues of corporate product development. Many of topics presented in the two theoretical courses –such as strategy, core competences, SWOT, market segmentation, consumer behavior, and economics of innovation- miss relevant experiences to link them to. The students need to be provided with concrete experiences and guidance in order to make these links.

3 THE CORPORATE & MARKET ORIENTED PRODUCT DEVELOPMENT CLUSTER

During the first part of the semester there are two theoretical courses: Market & Consumer and Corporate Product Development. The course Market & Consumer covers a number of subjects related to marketing strategies for new product development, such as marketing planning, analysis of the external environment of companies, segmentation and positioning, customization, and the interplay between products, promotion and advertising, pricing and distribution decisions. A second focus in this course is on consumer behavior. Topics that are treated here are consumption values and motives, product perception and categorization, and decision-making towards new products.
The course on Corporate Product Development places the product development process in its strategic, organizational, and economic contexts. The organizational and economic aspects are concentrated on individual product development projects within companies as well as the companies' portfolios of development projects. The course offers knowledge, insight, tools and some application of the strategic, organizational and economic base of the development process. Here, the topics are covered that are needed for the formulation of a new product development plan, such as: strategic objectives, core competencies, market opportunities, internal organizational structures, and project economics.
The 'sustainable product innovation' design project provides the first opportunity for students to experience the fuzzy front end of the product development process. The project is set-up as a role-play activity, in which a real product innovation is simulated in a short -eight-week- trajectory. Teams of students take on the role of a design agencies that have been hired by a company to propose and develop future (medium to long-term) directions for new product development. After each project step, each team presents the results to a design teacher in the role of client. A second design teacher functions as a coach. We provide the students with deliverables for each project step, but it is up to the students-team to decide on how to reach these deliverables, e.g. they themselves have to decide on which methods to follow and which tools to use. The

project ends with a preliminary design and business plan for the new product initiative, including, among other things, financial and market introduction aspects.

4 DIDACTICS WITHIN THE CLUSTER

As said in the introduction the aim of the new educational framework is to create a better integration between theory and practice. The framework for this integration contains disciplinary courses with a more theoretical signature and design projects with a practical signature (see fig 2a). The theoretical knowledge of the disciplines is taught in lectures, then exercised and applied in isolation during small 'discipline projects', and later applied within the context of the design project.

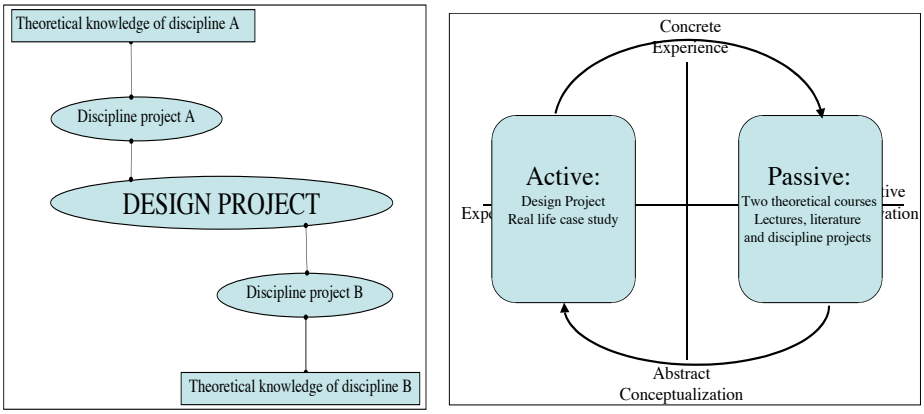

Figure 2a, left, Scheme of educational framework within cluster; 2b, right Didactic scheme of the cluster

In the design of the cluster as well as the design of the separate courses, the Kolb experiential learning model is applied on three different levels: the cluster level, the level of the disciplinary courses and the design project, and on the level of the interaction between courses and design project. Figure 2b shows the didactics at the level of the cluster. The theoretical courses are situated at the passive side of the Kolb learning cycle and the design project is situated on the active side. In the next paragraph we will zoom in on the detailed learning scheme of the discipline projects. Parallel to the classes there are discipline projects that help study the associated literature. These discipline projects consist of small case studies that are closely related to the theory. For instance, one discipline project relates to the economics of an innovation project for a certain company. Based on two-page case information the students have to make a financial analysis of the market situation, the company and the present products. This leads to insight in the feasibility of the potential product innovation project. Another discipline project is to identify in newspapers and magazines, real life examples that are illustrative for the theories in the literature that belong to the course (see figure 3).

This particular project helps the students to identify real life 'stories' that to certain level replace the missing concrete experiences. By reflecting on these stories and making connections to the theories from literature and lectures the theories 'come alive' to the students, bringing them into their world and making them understandable to a deeper level.

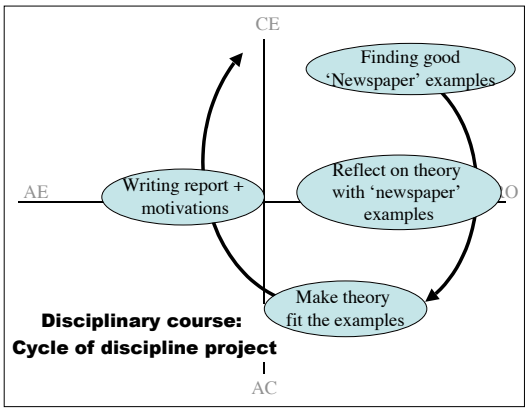

Figure 3: Learning cycle of one of the discipline projects.

The design project is built up of six successive learning cycles covering the principal phases of a product innovation process, ranging from making a strategic vision to constructing a new product business plan. A cycle starts with reflecting on last week's project step, the presentation, and the client's comments on the work done. This, together with knowledge provided in the disciplinary courses provides them with the understanding needed to set up the next project step. (see figure 4).

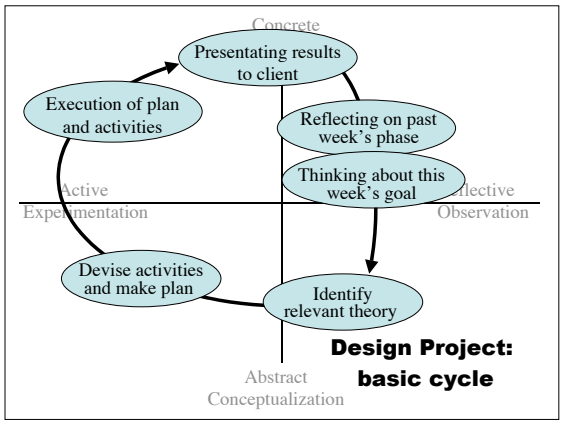

Figure 4: The basic learning cycle in the design project.

The students then engage in the practical work of this project step, and present and discuss the results, which in turn provides input for the next week's learning cycle.

5 LEARNING WITH FISH BOWL SESSIONS

The learning scheme of the discipline projects covers two learning cycles (see fig 5). In the first cycle the assignment of the discipline project is studied, provided with a theoretical answer, a simulation of that answer (does it fit, is it OK?), and finally the decision to write it down. This answer is handed over to the lecturer, to ensure that students have done their own analysis on the topic, before entering the second learning cycle in which all students come together. An equally important reason for having students submit their work is that students will not step into the second learning cycle

before committing themselves to an answer. This idea comes from a focus group interview method, where people are asked to write down their position on a topic before that topic is discussed in the group. This technique ensures higher commitment to a certain position and more elaborate discussions about alternative positions [3].

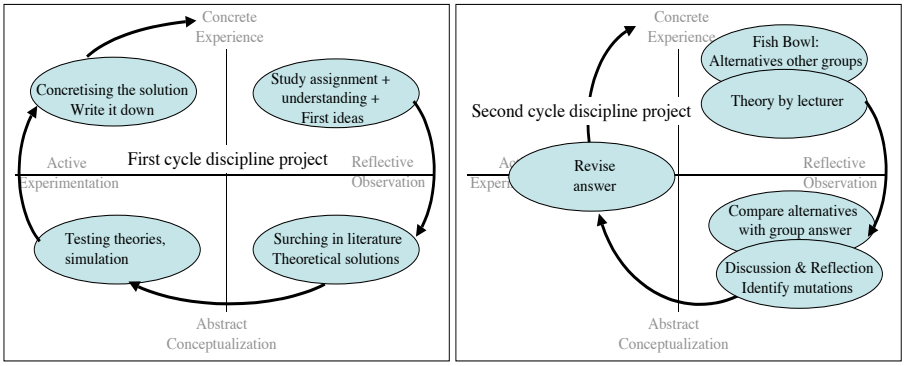

Figure 5: Discipline project including Fish Bowl: two successive learning cycles.

The second learning cycle starts with presenting the answers of some of the groups in a plenary session. We have named these plenary sessions 'Fish Bowl' sessions, i.e. there is a small inner group of about 20% of the students that presents their answers to the large group (>200). During these presentations the lecturer may ask challenging questions to stimulate discussion among the whole group. Students are engaged in this discussion because they have just handed in an answer that commits them to a certain position. After a few presentations and discussions, the lecturer presents his/her view on the assignment. After the fish Bowl session -a typical Fish Bowl lasts about three hours- all the students are encouraged to revise their first version of the answer. In order to do this they have to compare the alternatives they have heard in the Fish Bowl with their own answers. The identification of necessary mutations and revising the first version, including a valid motivation, closes the second learning cycle. The lecturers grade the assignment based on the quality of the first answer, the improvements made to come to the second answer, and the motivation for having improvements.

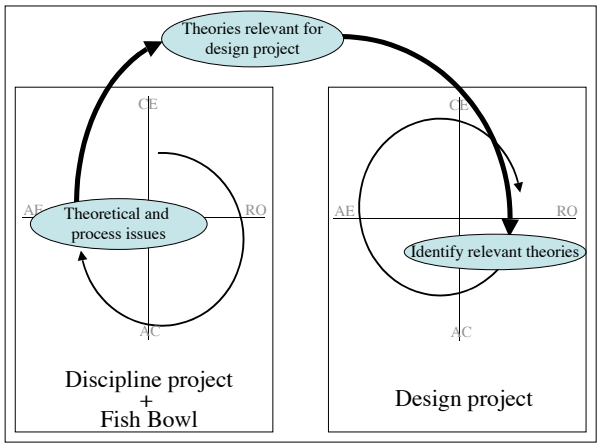

Figure 6: The discipline project with Fish Bowl delivers theory to the design project.

During the Fish Bowl students already know that they need to make improvements on their initial answers. This is important because it stimulates them in the Fish Bowl to try and persuade the lecturer that their initial answers were valid, to reduce the amount of revisions needed for their final answer. In combination with their commitment to their initial answer, the Fish Bowl thus provides a setting in which both the presenting student groups and the groups that form the audience actively take part in the discussion of the topic at hand.

During the second quarter of the semester the discipline projects run in parallel with the Design Project. The assignments of the discipline projects are more or less intertwined with the stages of the Design Project. For each stage of the Design Project there are one or two discipline projects with Fish Bowl sessions that address theoretical and process issues that are relevant to the stage of the Design Project. The 'Fish Bowl' sessions enhance the reflecting and theoretical part of the learning cycle. This way the discipline project including the Fish Bowl session provides input for the identification of possible theoretical tools that can be applied in the design project (see figure 6). During the discipline project they 'play' with different theoretical concepts and compare them. The Fish Bowl sessions then supply other considerations. All this builds up to having some 'concrete experience' on the theoretical level that can be used as input in the learning cycle of the design project at the point of 'abstract conceptualization'.

As the desired levels of learning at this point require in-depth participation and deep understanding, lecture-type education is less appropriate. The Fish Bowls provide such in-depth participation by engaging not only the small group of students who are presenting, but also the larger group who are listening. As such, they provide a good alternative to group discussions, when small group teaching is not feasible.

6 STUDENT EVALUATIONS OF THE CLUSTER

In 2003 this cluster ran for the first time. In order to get information about the quality of education, a course evaluation was conducted. For the cluster this was done by a quantitative survey among the students (n =76) on the design project and a qualitative survey with open questions on the total cluster (n=11). This last survey was followed by a group discussion with those students that filled out the qualitative survey. In this section we will briefly discuss the relevant findings.

In broad terms the entwining of the design project with the two disciplinary courses worked out positively. Remarks like: "We could apply in the design project what we had done for the Fish Bowl session, however not without thinking. The Fish Bowl sessions ran in front of the stage in the design project, which was good." and "Get the theory sharp that could be applied in the design project." largely express what we heard from the students. Regarding the idea behind the Fish Bowl we heard things like: "An attractive way to present the theory." And, "It was very informative, the interactive feedback and the possibility to make corrections." We also learned that the lecturer must have some facilitation skills, in order to get and keep the discussion in the Fish Bowl going. See for instance Isaksen et al [4] for a set of required facilitator characteristics.

Not all Fish Bowl sessions were alike. In one session we experimented with addressing the content of the cases from the design project itself. That proved to be more difficult, since students then started to focus on getting the most useful answer for their practical project, without being interested too much in the theoretical questions per se. From the quantitative survey we learned that 57% of the students were satisfied of which 19 % were very satisfied about the combination of discipline projects and Fish Bowl sessions as a means to create theoretical awareness that is relevant for the particular stage in the

design project. From these and other comments we learned that the overall concept of Fish Bowl discussions and the way they were connected to the various stages of the design project is successful, even though there is always room for fine-tuning.

7 TOWARDS INTEGRATING THE LEARNING CYCLES

We have showed how the experiential learning model of David Kolb can be of use to integrate courses on theory and design practice. By ways of discipline projects and Fish Bowl discussions the theoretical concepts flow into the 'abstract conceptualization' part of the design project cycles. This leads to a better understanding and use of the various theoretical concepts. The successive learning cycles of lectures, discipline projects, Fish Bowls, and design project together provide an easier internalization process of the theory.

However, at this point all these cycles end with having a 'concrete experience' at the end of each stage in the design project. Neither the assignments for the disciplinary projects, nor the way the design project is organized, do incorporate this 'experience'. For an optimal use of the experiential learning cycles, this would be advisable: Reflection on the experiences in the design process. This could provide the students with a deeper understanding of the theoretical concepts and a 'hunger' or 'receptivity' for additional theoretical knowledge on one side and a willingness to experiment in future design projects on the other. Such an additional reflection would require theoretically competent coaches on the side of the design staff, as well as extra effort for the teaching staff of the disciplinary courses.

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