Teaching And Organising: 
The Case Of Problem-Based Learning

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1. INTRODUCTION

As far as its teaching method is concerned, an educational institute can choose from several options, e.g., case studies, plenary lectures, distance learning, correspondence courses, work-shops or problem-based learning. The selection of a teaching method can be considered as the choice of the teaching institute's production technology, and has therefore implications at both the strategic and operational level. The strategic implications include features of the product and structure of the organisation, while the operational implications pertain to the implementation of the teaching process and the quality control of the end product. According to the standard contingency theory in organisation sciences (Daft, 1992), there should be a fit between all the strategic and operational decisions in order to achieve good performance. This paper adopts contingency theory to develop a framework in order to answer the following question: How should an educational institute be organised - at the different levels - in order to facilitate the effectiveness of problem-based learning? So, although the issue of strategy formulation is discussed in passing to set the scene, the focus of the current paper is on the issue of strategy implementation, particularly through a number of elements of organisational design.
Of course, the current paper is only a first step in evaluating the strategic and organisational ins and outs of PBL at the FEB of the University of Maastricht, including the consequences for performance. As a meta message, we believe that applying organisation theory to analyse the functioning of teaching institutes will produce insights that may be helpful while developing, sustaining and adapting innovative teaching initiatives.

The paper is organised as follows. In Section 2 we will discuss the options relating to strategy formulation and organisational design. In Section 3 we will describe the three features of problem-based learning (PBL) as applied at the Faculty of Economics and Business Administration (FEB) of the University Maastricht. Then, we will develop the theoretical framework in Section 4. Subsequently, we will introduce the current state of the art of the organisation of the FEB in Section 5. A comparison of the theoretical framework with the current situation is made in Section 6. In advance, three remarks are worth making. First, given the breadth of the issues of strategy implementation and organisational design, this paper can only be explorative by elaborating on a limiting number of the relevant elements. Second, this paper's contribution is not the development of a new theory, but rather the application of a well-established theory (organisation sciences' contingency theory) to a new case (PBL at the FEB). Therefore, the argument can largely be based upon the textbook knowledge of strategic management on the one hand (e.g., Johnson & Scholes, 1993) and organisational design on the other (e.g., Daft, 1992). Third, as a side effect of the case description, specifically in Section 5, factual information on how PBL influences the organisational design of an economics and business administration faculty is provided.

2. STRATEGIC MANAGEMENT AND ORGANISATIONAL DESIGN

The objective of strategic management is to position an organisation in the environment such that performance - given the organisation's objectives - is maximised. Hence, a basic principle of strategic management is that there should be a fit between the external environment and the internal organisation: the better this fit, the better the performance of the organisation (Johnson & Scholes, 1993). To establish this fit the organisation has to formulate and implement a strategy. Here, the organisation's management has a number of strategic options, a selection of which will be briefly discussed below.

Ideally, a strategy is based on an analysis of the opportunities and threats in the environment on the one hand and the strengths and weaknesses of the
capabilities of the organisation on the other hand. Strategy can relate to three levels: corporate, business and operational (Johnson & Scholes, 1993: 9). First, at the corporate level management has to decide where to compete - that is, the businesses the company wants to be in. A university is in the education and research businesses, but management still has to choose the faculties and research institutes to be founded and sustained. Second, at the competitive or business level management decides how to compete. Questions like "What are the characteristics of the product we offer?" have to be answered. With respect to business strategy, Porter (1985) distinguishes three generic profiles. The first generic strategy, cost leadership, is aimed at obtaining the lowest price in the market. Cost advantages can be achieved by economies of scale, or a preferential position regarding resources. The second generic strategy, differentiation, seeks to position a company by differentiating its product from competitors by offering something special, albeit probably at an extra cost. The third generic strategy, focus, implies a concentration on a specific segment in the market, e.g., a specific customer, product or geographical area. Then, the organisation applies either a differentiation or a cost leadership strategy within a specialised part of the industry. Translated to a university, defining the business strategy implies decisions on what kind of graduate the university wants to deliver, and at what costs. The knowledge transferred, the skills learned and the educational costs are all features which concern the student and society, both being consumers of the services provided by the university. Given the paper's focus on the organisational implications of PBL, we focus on the business strategy level below.

After the business strategy has been defined, it has to be implemented. This concerns the third level, the operational or functional level. Here, decisions about such issues as the functional areas, the organisation structures and the control systems have to be made. The key functional area at a university is production or teaching. Regarding this function, management must select a technology - that is, the nature of the production system - which includes the actions and techniques used to change organisational inputs into outputs (Daft, 1992, p. 15), entailing that a university can choose from a variety of teaching methods - e.g., distance learning, case studies, plenary lectures or problem-based learning. Each teaching method 'produces' a different kind of graduate, at different prices. Organisation structure concerns, for example, decisions about specialisation of jobs, training and indoctrination, formalisation, grouping, unit size, planning and control systems, liaison devices and centralisation (Mintzberg, 1983; Daft, 1992). Grouping here refers to persons or units that are put together, on a basis of similarity (Mintzberg, 1983, p. 48), while formalisation pertains to the amount of written documentation in the
organisation by which management describes behaviour and activities (Daft, 1992, p. 13).

The decisions on organisation structure are influenced in a number of ways, two key determinants being strategy and environment. The environmental influence is a well-established example. Here, relevant dimensions of the environment are the level of complexity and the incidence of change, both of which have an influence on standardisation and centralisation. A structure is bureaucratic to the extent that its behaviour is predetermined or predictable, whereas an organic organisation is characterised by the absence of standardisation. A structure is called centralised when all power rests at a single point in the organisation. Whenever power is dispersed among many people, the structure is called decentralised (Mintzberg, 1983). The preferred structure depends on the type of environment.

After the structure of the organisation is drawn up and the technology has been selected, the organisation is set to work. At different places in the transformation process control devices can be installed. Merchant (1985) distinguishes three types of control: results control, action control and personnel control. Results control refers to the comparison of a standard with the outcomes of a process, resulting into rewarding or punishing people. In this case, it is important to find an unambiguous standard as the benchmark for comparison. Results control can take place after the production process has been completed. Action control includes several forms of control, such as behavioural constraints to prevent certain actions, pre-action reviews to be used before the action takes place, accountability control where employees are held accountable for their actions, and duplication where several units or employees perform the same action to increase the probability that the task will be completed successfully. The third type of control is personnel control, in which internal motivation of individuals and group pressure is used to obtain the desired results.

3. PROBLEM-BASED LEARNING

Problem-based learning is a rather new teaching tool, which was developed at the McMaster University (Canada) in the 1950s and 1960s to cope with new societal demands. The first demand is to establish a closer link between education on the one hand and the needs of professional training and practice on the other hand, which is reflected in a multidisciplinary orientation of curricula. Second, there is a demand for ‘life-long’ continuing education in society in general and in professions in particular. The third demand is an increase in the effectiveness of higher
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education (Gijsselaers, 1995). At the FEB problem-based learning has been defined as a learning approach in which students tackle problems in small groups under the supervision of a tutor, who is usually a teacher. In most of the cases, a problem consists of a description or compilation of phenomena and events that can be perceived in reality - which have to be analysed, explained and/or solved by the tutorial group in terms of underlying principles, mechanisms and processes. Three crucial elements of PBL are: (1) the seven-step learning procedure, the so-called ‘seven-jump’ at Maastricht; (2) small-group teaching; and (3) (sub) disciplinary integration. Each element focuses on different qualities of the end product.

Firstly, the procedure that students apply to analyse the problem is called the **seven-jump procedure**, containing the following steps: clarify terms, define the problem, analyse the problem and try to find explanations, discuss the explanations, formulate learning objectives, self-study and report in the group (Moust et al., 1989, p. 30). Note that it is not the seven-jump procedure per se that matters: this procedure is a vehicle that facilitates the **systematic** handling of the problems that are generally formulated in the form of tasks in the course book. So, by applying the seven-jump procedure students acquire skills in solving problems. Additionally, students are themselves responsible for the learning process, so fostering self-study skills.

Secondly, by means of co-operation in **small groups** students acquire social skills that are useful in their future professional live. The role of discussion leader is rotated among the group members, just like the role of minutes secretary. The role of discussion leader is both content and process related, although the emphasis is on process. The task of the group members is to participate in the discussion and to contribute to the analysis of the task. Listening to the contributions of fellow group members and communicating findings regarding the learning objectives are other social skills that are trained. The role of the tutor is to stimulate the learning process, by asking questions if the report is too shallow and pointing out contradictions. A further tutor role is to enhance the process of co-operation, in which case the tutor focuses on participation, application of the seven-jump approach and the functioning of the discussion leader.

Thirdly, the final distinguishing feature of problem-based learning is the **integration** of different (sub) disciplines. This can be achieved in the design of the course book and the task problems. In this way, a problem is viewed from different (sub) disciplinary perspectives. The aim is to deliver generalists rather than specialists, so that a ‘PBL-graduate’ is able to tackle real-world problems by taking account of different (sub) disciplinary angles.
4. APPLYING ORGANISATION THEORY TO PROBLEM-BASED LEARNING

4.1 The framework

After discussing the features of strategic management, organisational design and PBL separately, we will now put them together. First, we discuss the strategic part in Section 4.2. Then, we propose a framework relating to the organisational design at the different levels of decision making in Section 4.3. In this section we also formulate three propositions to link organisational design to PBL.

4.2 University and Faculty strategy

With respect to the corporate strategy, the UM started in the seventies with the Faculty of Medicine, subsequently adding Health Sciences, Economics and Business Administration, Law, Culture Sciences, Knowledge Technology and Psychology. Here, the university cannot benefit from complete autonomy, as the creation of a new faculty (i.e., graduate program) requires ministerial approval. Concerning business strategy, management has, according to Porter (1980), the following options: cost leadership, product differentiation and focus. Cost leadership is reflected in the price asked for a product. The price of education interests both the student and society. Education in the Netherlands is mainly financed by society, in this case the government. In effect universities cannot ask fees from students.

Product differentiation reflects an alternative option. Society and the student will be interested to know which knowledge, skills and attitudes will be learned and - especially for students - in which way the service is provided. A related question is: “How well are the students prepared for their career?” The percentage of unemployed graduates could be an indicator here. Based on requirements of society, the FEB seeks to educate students by applying a multidisciplinary approach, a life-long education attitude, and an effective way of teaching. Moreover, a new trend in the environment is globalisation, which has led to an emphasis on internationalisation during both education and training. As a consequence, new products, International Business, the International Management and International Economic Studies specialisations, are been developed. So, both PBL and internationalisation enable a differentiated product to be offered to the student and society.

Focus, in contrast to product differentiation and cost leadership, implies concentrating on only a small part of the total market. While the faculty does address the total market of students who want to study economics and business administration, it has developed a number of special programs that
target specific groups of potential students or labour market segments. This reflects a portfolio of focus strategies.

The functional strategies are aimed at achieving the targets defined in the business strategy. For a university, the most important functional strategy is production or teaching. Regarding technology choice a number of options are open. As already stated, the University of Maastricht and thus the FEB has selected PBL as the core teaching method. In effect, during information seminars and in all the information brochures sent to aspiring students PBL is promoted. In a production organisation this would be part of the activities of the marketing department.

4.3 Organisational design

By way of illustration, this paper concentrates on three elements of organisational design (1) grouping; (2) formalisation and training; and (3) unit size. Basically, we will confront these elements of organisational design with the characteristics of PBL. Grouping will be combined with integration, formalisation and training with the seven-jump and unit size with social skills. For each characteristic we will formulate an illustrative proposition. Of course, much more can be done. However this paper only reflects an interim report of work in progress.

4.3.1 Integration

The first issue here concerns what has to be integrated. The traditional university is horizontally specialised (Mintzberg, 1983). In the case of a Faculty of Economics and Business Administration this means structuring around several chairs, e.g., accounting, finance, macroeconomics, microeconomics, organisation and strategy. According to Mintzberg (1983, p. 280), grouping in a professional bureaucracy is done by function or market. Because of the complex and stable environment of a university, there are only few integrating roles (Daft, 1992, p. 85). In order to facilitate PBL, targeted devices have to be developed to integrate chairs. By way of illustration, we will concentrate on the grouping device.

Grouping at the faculty level with the intention of integration can be achieved through several routes. Grouping by product could be effectuated by grouping staff members associated with the different chairs in units focused on the different products of the faculty. These 'products' are students in Economics, Econometrics, Fiscal Economics, Business Administration, International Business, International Management and International Economic Studies. In each unit, representatives of the different traditional chairs can be found. The classical division of chairs is
abandoned. Grouping by **time** could be effectuated by grouping staff members associated with the different chairs in units focused on the different years in the curriculum. In this way of grouping, staff members of the different chairs are spread out over the different years. An alternative structure would result from grouping by **courses**. In this case, staff members are placed together based on the topics dealt with in a course. However, scale effects are then not exploited. Moreover, the number of courses generates a large span of control for a supervisory unit.

Besides to teaching, research is also a core activity of a university. Research is based upon grouping by knowledge. Combining the viewpoints of teaching and research results in a matrix structure. As Mintzberg (1983, p. 93) argues: "in cases where the operating core is manned by professionals whose work interdependencies require them to function as a team mutual adjustment is the key co-ordination mechanism, and task forces and shifting matrix structures key design parameters."

But, no matter what the way of grouping at the faculty level, at the teaching level students have to become acquainted with integration. Thus, the grouping of tasks in the course book should reflect the notion of integration. This could imply that the tasks dealing with a topic from a particular chair are mixed with those from other chairs, or that several topics from different chairs are integrated into one task. The influence of integration on grouping at the test level can be stimulated if topics of different tasks and disciplines are combined within a question. Furthermore, another option is to ask questions relating different (sub) disciplines and tasks on the basis of the same case description.

**Proposition 1:** *In the light of PBL's need to integrate different (sub) disciplinary perspectives in the teaching material and process and acknowledging the role of research, grouping by product, time and/or course should be implemented in the context of a matrix structure.*

### 4.3.2 The seven-jump procedure

As has been noted, Mintzberg (1983) and Daft (1992) classify the environment of a university as stable and complex. Therefore, only a little formalisation is needed (Daft, 1992; Mintzberg, 1983). However, the seven-jump procedure demands heavy formalisation. The seven-jump offers, as already mentioned, a structured way of solving problems. It serves to tackle each task in the course book, the so-called block book. The students in a group know the steps of the seven-jump and what is expected from all participants in each step. This also applies to the discussion leader, the
minutes secretary and the tutor. Students are themselves responsible for the learning process. So, the tutor is much more a stimulator of the learning process than a teacher specialised in the field of study. The behaviour of the group members is strongly regulated - or in terms of organisational design: formalised. In an organisation the level of formalisation is reflected in the number of specifications written down in documents.

As far as teaching material is concerned, at least one document is standard, namely a course book in which the tasks are presented. In addition, at the testing level formalisation is reflected in the documents used during a test. The most formalised form would be a written test, with closed questions, in which aspects of the seven-jump have to be applied. How to compose and use the teaching material has to be learned by training.

At the level of the teaching process, specific knowledge and skills are required in order to be able to apply PBL effectively. This is true for all participants, including the tutor. Therefore, both new students and new tutors have to be trained before they can enter the actual teaching process.

**Proposition 2:**

(a) *PBL's seven-jump approach demands heavy formalisation of the teaching material and process.*

(b) *In the light of the observation that the seven-jump procedure implies heavy formalisation of the teaching material and process, in-depth training of new students and tutors should take place.*

### 4.3.3 Small groups

Teaching the students social skills is another characteristic of PBL, which is achieved by working in small groups of about twelve students. Working with small groups has certain organisational implications. Managing many small groups and the related number of tutors is completely different from the orthodox context with a single teacher in a large lecture room. If we consider the number of times a meeting is held as an indicator for the kind of production process, then PBL can be categorised as mass production. A lecture could be classified as unit production. Process production would apply if a lecture is put on video tape and can be watched by students whenever they prefer. In this paper we will concentrate on the organisational aspects - specifically, the type of production process and with that the span of control. This is strongly related to the design parameter unit size. According to Mintzberg (1983), unit size in a professional bureaucracy is large at the bottom and small elsewhere.

At the faculty level the span of control relates to the number of planning groups and their sizes. Many planning groups imply that many different
courses are offered, so that students have much choice in their curriculum. Assuming that students will spread out equally over the different courses, planning groups can be rather small. If a limited number of courses are offered, economics of scale can be exploited. But then planning groups have to be rather large, because of the large number of students who take a specific course. So, many different courses means, on average, a large span of control at the faculty level and a small span of control at the teaching level. At this teaching level, the span of control is the number of tutors which has to be managed by the block co-ordinator, a number simply dependent on the number of students.

The influence of small groups (social skills) on the unit size at the testing level can be described as follows. The objective of small-group teaching is to train social skills, which can be tested through a written, an oral or a practical test. In terms of Merchant (1985), we then apply results control. The best way to test social skills would be a kind of practical test in a tutorial group, indicating that the group size at the testing level varies from ten to twelve. This seems to be a rather small span of control. The tutor, however, is not only responsible for the contents of the meeting but also for the process, i.e., the way people are collaborating in the group. The discussion leader is also responsible for the functioning of the group: given the fact that (s)he is a starting student, twelve students may be an appropriate group size.

Proposition 3: (a) At the level of a course, PBL demands a high span of control.
(b) At the level of teaching groups, PBL requires a low span of control.
(c) On the assumptions that all the students follow an enforced series of courses in years 1 and 2 (Section 3) and that the planning group delivers all the tutors, the planning group in years 1 and 2 should be larger than in years 3 and 4.

5. ORGANISATIONAL DESIGN AT THE FEB

5.1 Introduction

In this section we will describe the teaching situation at the FEB as in 1991. This point of time has been selected because by then the most extensive implementation of the problem-based learning technology was completed. First, we will give a general description of the three decision
levels - faculty, teaching and testing. The three key elements of problem-based learning will be discussed subsequently.

5.2 General description

At the top of faculty is the board, which is accountable to the faculty council and the university board. Furthermore, there are several committees (such as the examination, testing and educational committees), a students administration and three the departments [see the Appendix (the upper part)]. The testing committee is responsible for organising the progress test. This kind of test derives from the problem-based learning philosophy, and will be discussed later on. It is worthwhile mentioning that this committee is placed at a rather high level in the organisation.

The study at the FEB is based on a curriculum of four years. Each year consists of six block periods of six weeks each. During each block period two courses are offered simultaneously. The so-called 3rd-course takes about 14 hours a week, and comprises skills training modules such as computer skills, bookkeeping, mathematics and statistics. The so-called 3rd-course has an economics and business administration content, and is based on a study load of 26 hours per week, including two group meetings. The courses in year 1 (1.1-1.6) are obligatory to all students, irrespective of their specialisation, just like the courses in the first half of year 2 (2.1-2.3). These courses deal with the basic topics that every student of the FEB must know. Halfway through the second year students choose their specialisation: Economics, Business Administration or International Management. The courses in the second half of year 2 (2.4-2.6) and the start of year 3 (3.1-3.2) are different for each specialisation. Problem-based learning is applied in year 1, year 2 and the start of year 3. The courses beyond period 2 in year 3 may apply other teaching and testing methods, and can be selected freely by the students, depending on their specialisation. Within each specialisation students can choose from courses offered by different departments or chairs. This means that a student of Business Administration (BA) can select any course offered by a chair within the BA department. A student of business administration may end up with courses from organisation only (the specialist) or from all the business administration (sub) disciplines (the generalist), or anything in between. During the specialisation phase students have to take a course offered in the context of the research programs Technology, Labour and Government. These research programs were intended to integrate economics and business administration perspectives dealing with the topic at hand. Testing is done in two ways. Each course ends with a knowledge test that has to be completed by every student participating in the course. Further more, there is a progress test, which is
intended to measure the progress in knowledge acquired by the student over the years (see Tempelaar, 1997). The test comprises questions from the courses 1.1 to 3.2, and is specialisation-specific. All students have to take the test. The expectation is that students, who have taken all the courses until module 3.2, have sufficient knowledge to pass the test.

5.3 Grouping

At the faculty level there are two kinds of grouping, as depicted in Appendix I. First, four departments are grouped on the basis of knowledge: Business Administration (BA), Economics, Quantitative Economics, and Educational Development and Research. Because of their size, the BA and Economics departments are divided into ‘sections’, each being associated with a specific chair. So, BA contains accounting, finance, marketing and organisation (including strategy). Economics has macroeconomics, microeconomics, international economics and public economics. This is the classical division in (sub) disciplines. That is, the chairs are associated with the orthodox (sub) disciplines that can be recognised in virtually all economics and business administration teaching institutes around the world.

The second kind of grouping is on the basis of courses. Each course focuses on a specific problem field, and includes topics from different (sub) disciplines (chairs). The unit responsible for a course is called a planning group, and encompasses staff members from the different departments or chairs involved. This is true for all the courses 1.1. to 2.3 (the common part of the curriculum). In all these courses multidisciplinary integration is effectuated. For example, the planning group of course 1.1 consists of members of four chairs: finance, macroeconomics, microeconomics and organisation. However, the department or chair itself is monodisciplinary and all the topics belonging to it are split up over different courses. In the Appendix, the lower part, an example is given of the integration in block 1.1 and the monodisciplinarity of the organisation chair.

For the grouping of tasks we have to look at the course book. The course book is generally organised around a case, being the leading thread. Each task deals with an aspect of this case. This aspect can be traced back to the (sub) discipline represented in the planning group. For example, course 1.1 is about the organisation of the economy and consists of two themes: the economy and economic order on the one hand and economic order and the financial world on the other. For an overview of the tasks and their origin we refer to the Appendix. We can see that almost every task is related to a single department and chair, dealing with one topic. The different chairs are pretty mixed up, but there is only one task (no. 8) in which different chairs are integrated.
The third kind of grouping refers to the testing level. Here, we look at the grouping of questions in two kinds of tests: the block or knowledge test, and the progress test. The questions in a knowledge test are mostly grouped according to the chairs participating in the course. The grouping of questions in the progress test is done also on the basis of chairs. For example, question numbers 21-35 are reserved for organisation questions about the courses 1.1-2.3 and question numbers 119-134 are reserved for questions about the courses 2.4-3.2, the specialisation part (see also Appendix I).

5.4 Formalisation and training

At the faculty level staff members are trained as tutors as soon as they join the university. This training takes about two days. Students are trained in the first three weeks of course 1.1. In each week an extra meeting is scheduled so as to pay attention to problem-based learning. These meetings are underpinned by the book Probleemgestuurd leren [problem-based learning] by Moust et al. (1989).

Formalisation of teaching can be found in the course book - with the tasks, information about testing, literature and generally a time schedule. The time schedule describes which tasks have to be discussed in which group meeting. For the tutor, there is a tutor instruction, with an elaboration of the tasks in the form of possible problem statements, analysis outcomes and literature references. The objective of this heavy formalisation of the teaching material is to 'standardise' the teaching processes and outcomes that are guided and produced by so many different tutors from so many different departments and chairs.

At the testing level knowledge and the seven-jump have to be tested. The testing of knowledge is done through formalised true/false questions. Because of the problems with composing these kinds of questions, a guideline has been written by one of the staff members (Tempelaar, 1993). The seven-jump is tested in an informal way. At the end of each meeting, the teaching process is evaluated. In this evaluation the application of the seven-jump procedure by the group can be discussed.

5.5 Unit size and span of control

At the FEB there are several units at different levels. The departments are located at the faculty level (see the Appendix), having the following size in terms of staff members (full-time equivalents in 1991): 27 in Economics, 73 in Business Administration, 18 in Quantitative Economics, and 4 in Educational Development and Research. This distribution can be explained
by the division of students over the specialisations. About 75% of the students in the second year opt for Business Administration, 20% for International Management and 5% for Economics. Because of the large size of the Business Administration department, this department has been split up into five 'sections', each being associated with a specific chair: accounting, finance, informatics, marketing and organisation.

The planning groups are located at the teaching level and they are responsible for specific courses. They consist of about two to four staff members. The planning group is accountable to the departments 'to which' its members belong and to the educational committee (see the Appendix). All the students in year 1 (500) and part of year 2 (400) have to follow the same track. This means that there are 17 tutors needed per course in year 1, and 16 in year 2, assuming 2.5 groups per tutor on average. When needed, the planning group is enlarged by including tutors from other chairs. During block 2.4 to block 3.2 the number of tutors differs per specialisation. It may even happen that the planning group itself does not deliver a tutor, because other staff members specialised in teaching are first assigned to the tutorial groups.

At the testing level the unit size is the size of a tutorial group. As already discussed, the objective of small-group teaching is to stimulate the students to learn social skills. This is not formally tested, but at the end of each meeting the contribution of the discussion leader, minute secretary and other group members is discussed. There is a formal presence registration: students have to attend at least nine of the twelve meetings.

6. APPRAISAL

6.1 Introduction

After the description of the organisational design at the Faculty of Economics and Business Administration we will now discuss this briefly in light of the propositions formulated in Section 4. Since the description of the FEB is based on the situation of a few years ago, we will also indicate recent developments. Finally, we will value the fit between environment and faculty by comparing the judgement of the students as to the teaching quality at the FEB and other Dutch faculties of economics and business administration.
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6.2 Theory and practice

From the discussion in Section 4 three illustrative propositions were formulated. These will now be briefly discussed successively.

**Proposition 1:** In the light of PBL's need to integrate different (sub) disciplinary perspectives in the teaching material and process and acknowledging the role of research, grouping by product, time and/or course should be implemented in the context of a matrix structure.

Grouping at the faculty level is twofold. The main grouping is by knowledge through the departmental classification: Economics, Business Administration, Quantitative Economics, and Educational Development and Research. The next level is the planning group, which implies grouping by course. The planning group is accountable to the departments 'to which' its members belong and to the educational committee. This clearly reflects a matrix structure. The tasks in the course book, i.e., the teaching level, are spread out over the course, without (sub) disciplinary grouping. But at the testing level questions are grouped on the basis of knowledge through a clear distribution over (sub) disciplines. So, the grouping at the teaching level is not continued at the testing level.

**Proposition 2:** (a) PBL's seven-jump approach demands heavy formalisation of the teaching material and process.
(b) In the light of the observation that the seven-jump procedure implies heavy formalisation of the teaching material and process, in-depth training of new students and tutors should take place.

At the faculty level there are special training modules for new students and new staff members. Such training is supported by the book Probleemgestuurd leren [problem-based learning] (Moust et al., 1989). There is, however, no follow-up training. At the teaching level we find the course book and the associated tutor instruction. At the testing level there is a test composition guideline. Testing of the seven-jump is done informally through meeting evaluations. Overall, the level of formalisation is high, with the purpose to standardise teaching process and outcomes.
Proposition 3: (a) At the level of a course, PBL demands a high span of control. 
(b) At the level of teaching groups, PBL requires a low span of control. 
(c) On the assumptions that all the students follow an enforced series of courses in years 1 and 2 and that the planning group delivers all the tutors, the planning group in years 1 and 2 should be larger than in years 3 and 4.

At the level of a course the block co-ordinator’s span of control may be high. For example, in first-year courses the block co-ordinator has to manage 17 tutors, many originating from other departments/chairs. At the level of the teaching process the tutor’s span of control is very low, as the size of teaching groups is restricted to twelve students. On average, the planning groups in years 1 and 2 are larger than their counterparts in years 3 and 4. Basically, the size of the planning group is positively correlated with the number of departments/chairs that are represented in the course at hand. This correlation is absent if the number of registered students is considered. Shortage of tutors is simply resolved by transferring other staff members temporarily. This way two different tasks are created first the development of course and second the supervision of the tutorial groups. This means vertical job specialisation, a phenomenon uncommon for professionals.

6.3 Recent developments

In response to - and anticipation of - internal and external misfits the FEB has re-organised both the curriculum and the structure in the post-1991 period. As far as internal misfits are concerned, particularly the perceived ineffectiveness of too much integration - in terms of both students’ learning behaviour and tutors’ co-ordination activities - induced a critical evaluation of the curriculum. Additionally, the environmental trend toward increased internationalisation in combination with a decreasing number of prospective Dutch students prompted the FEB to reconsider the design and portfolio of graduate studies and specialisations. In the end, the critical evaluation resulted in the implementation of five major changes, besides to a large number of minor adaptations. First, the ½-3½-curriculum design has been re-arranged. Secondly, the testing strategy has been changed by (i) making all course tests in years 1 and 2 obligatory and (ii) replacing the progress test, with closed questions only, by an overall test in years 1 and 2, with both closed and open-ended questions (see Tempelaar, 1997). Third, the degree
of integration has been downsized by (i) limiting the number of disciplines per course in years 1-2, compensated by (ii) the integrative nature of the overall test and (iii) the requirement to take a number of integrative courses in years 3-4. Fourth, the teaching method has been adapted, by introducing plenary lectures alongside to tutorial meetings in years 1-2 and adding six weeks of skills training in years 3-4. Finally, the curriculum portfolio has been expanded.

It is beyond the scope of the current paper to offer an in-depth analysis of the determinants and consequences of this re-organisation. Suffice it to say that the key teaching methodology is still PBL, albeit adapted - that is, (a) small-group teaching still dominates all curricula, (b) integration is still a key characteristic of all programs and (c) the seven-jump procedure is still applied in years 1-2 (without being completely absent in years 3-4, but in many courses being replaced by other devices that stimulate problem-based learning).

6.4 The faculty’s performance

Measuring a university or faculty’s performance is all but easy. A large set of performance measures is imaginable. For example, the quality of the courses, labour market experience of the graduates, the review by peers and the opinion of the graduates’ employers are just four examples of conceivable performance indicators. As an example, we will present the results of a recent national survey by the largest Dutch weekly newsmagazine Elsevier among 1,700 students from all universities in the Netherlands. Students were asked to provide marks to different teaching aspects. All respondents were studying for at least two years at a Dutch university, and at least 200 students were questioned per program. A comparison of all Dutch faculties of economics and business administration resulted in the best score for University of Maastricht (FEB) (Leeuwen, 1994). What is particularly striking are the Maastricht FEB’s (relatively) high scores on two teaching ‘products’, academic skills and scientific thinking, that define the very identity of university teaching. Of course, whether or not this high performance can be attributed to PBL cannot be derived from the survey results. However, it is PBL which differentiates the Maastricht FEB from all the other Dutch faculties.
REFERENCES


Tempelaar, D. (1997) Congruence Of Assessment And Instructional System: The Case Of Problem-Based Learning, This volume, Chapter #.

APPENDIX: TEACHING AT THE FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION

In the following scheme, by way of illustration, only course 1.1 *Organisation of the Market* and the spreading of the topics of the section (chair) organisation have been elaborated. The figures in the boxes at the conjunction of section and course indicate the numbers of the tasks in which topics from that section are discussed.
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Figure 1: Grouping at faculty level

PROGRESS TEST (covers all courses)