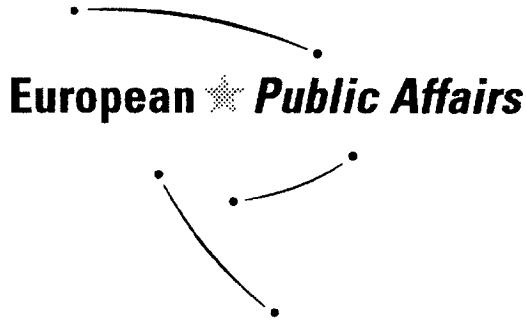
Problem-based learning in



Paper to be delivered at the ECSA Sixth Biennial Conference
Pittsburgh, Pennsylvania, 1999

by
Huub Spoormans
Maastricht University

Summary

Universiteit Maastricht (UM) and the European Institute for Public Administration (EIPA), both located in Maastricht, the Netherlands, offer an English-language postgraduate programme, leading to the degree of Master of European Public Affairs. The Maastricht Master's is designed as a programme of professional education on European affairs. The challenge of professional education is to create a learning environment that integrates academic expertise with 'learning by doing'. This paper describes how in the Maastricht Master's problem-based learning is used as an educational technology. Firstly, the professional goals and the consequent educational objectives are described. Secondly, two different teaching technologies are distinguished: teacher- and student-centred learning. Thirdly, problem-based learning is presented and discussed as a particular form of student-centred learning. Finally, the paper proposes a form of problem-based learning suited for public affairs education and based on project management techniques.

Professional goals

Growing interdependence in Europe generates an increased demand for people with a good understanding of the European environment. Today, policy problems transcend national borders and problem-solving capacities. Knowledge of, or experience with, national institutions and procedures are inadequate guides when people are faced with the problems of diversity in management and governance. More and more organisations will be looking for professionals able to work easily in a cross-national context.

In Europe, most graduates and professionals are familiar with their own national structures, institutions and practices. However, they are considerably less well informed when it comes to practices and processes in other European countries. If they have to collect and to assess information in another European country, nationally educated professionals often meet barriers to understanding in addition to language barriers. They face questions such as:

- What are reliable sources of information?
- What legislation, institutions or actors are important?
- What is the opinion of the public and the authorities with respect to particular issues?

Whatever their disciplinary or professional background, professionals operating internationally need training in the comparison and analysis of decision-making in the public domain in Europe and in European countries. The Maastricht Master's is designed to give professionals an understanding of the complexity of the European environment and help them to reformulate highly complex problems into more manageable and practical terms.

The objective is to enable students to learn to think in European terms, i.e., they become better able to collect and utilise information concerning the public domain in Europe and the European countries. in The basic principle of the learning process is to enhance the analytical skills and problem-solving capacities dealing with concrete issues and problems.

Educational methodology

The crucial point in professional education is to combine the knowledge base and methods of scientific disciplines with the skills needed to solve specific public sector problems. The direct application of scientific tools to policy problems is rare. The craft to solve public sector problems demands the ability:

- to make simplifying assumptions and to reformulate highly complex problems in more manageable and practical terms,
- to deal with a dynamic, ever changing political environment,
- to translate policy designs to real-world behaviours,
- to analyse and manage programmes in a fishbowl (Cohen, Eimicke & Ukeles, 1995: 606).

For a professional programme the question is how to bridge the gulf between academic theory and methods on the one hand and the often chaotic, always political, reality of public practice on the other. Professionals have usually learned to craft solutions to the problems they face by experience. However, 'learning by doing' usually takes place on the job, not in school. The challenge, therefore, is to create a learning environment that integrates academic expertise with 'learning by doing'.

Professional education implies that a programme focuses strongly on practising skills that are important for current or future professional practice. Learning skills, however, is more than practising techniques, such as language fluency or writing and discussion techniques. It is also a question of educational methodology. Today's students will be in active professional practice well towards the middle of the next century. Especially in the European context, they will practice during a period of accelerating and massive change in public sector management. This means that there is a good chance that the knowledge students acquire during their education will become outdated during their professional practice. Therefore, changes in society and in their profession will make self-directed learning throughout their life a sine qua non. Adapting to, and participating in, change requires the development of a number of component competences, such as the skills of communication, critical reasoning, a logical and analytical approach to problems, reasoned decision making, and self-evaluation.

Self-directed learning

The main objectives of the programme include that students

- are able to actively collect and process information concerning the public domain in Europe and the European countries
- have the skills to understand complex policy problems and to be innovative in organising solutions.

These goals include the ability to continue learning throughout their professional lives. This ability has many component skills (Barrows, 1994: 29):

1. *Self-monitoring*: The (public affairs) professional should be able to continuously monitor her or his progress with policy problems, noting where he or she may be puzzled or lack sufficient knowledge or skills.
2. *Self-assessment*: In addition to monitoring their performance, they should be able to determine if their performance is appropriate for the policy problems they are encountering.
3. *Defining learning needs:* Once inadequacies or weaknesses are recognised, they should be translated into defined learning needs so that appropriate areas of information, knowledge and skills can be identified.
4. *Determining the appropriate learning resource:* The public affairs official should be able to determine what available learning resource would be the most effective and practical for their defined learning needs.
5. *Using the resource effectively:* It is one thing to select the right resource and another to use the resource effectively. This is particularly true in the complex European environment and with computerised information resources.
6. *Evaluating the accuracy and value of the information in the resource:* It is important for the public affairs professional to question the findings or opinions of an author or another consultant and compare it with other information and opinions. This is increasingly important with the availability of computer data bases and internet-resources.
7. *Applying what has been learned to the present (and future) policy problems:* To close the link, the professional has to apply efficiently and effectively what has been learned.

Self-directed learning is an essential capacity for professionals in public affairs to keep contemporary in their practice and to meet the challenges of the changing public domain in Europe and the European countries.

In summary, we need a teaching technology that

- integrates academic theory and research with real-life situations
- stimulates active and self-directed learning
- develops the ability to solve problems.

Different teaching technologies

The conventional, teacher-centred educational technology does not meet the requirements mentioned above. A teacher-centred technology is based on the teacher's command of knowledge. Conventional teaching is 'supply side teaching'. To do this the teacher defines 'his' or 'her' course – as if the teacher is the owner – in terms of content, that is, subjects and reading materials. Supply-side teaching gives the teacher an active, but the students a quite

passive role.

Teacher-centred

The conventional way of teaching is that the teacher asks students to read specific materials, like a (chapter in a) textbook or articles on the subject matter. Then the teacher will give a lecture, summarising and commenting on what the students should have read. Rational students, however, will probably delay reading the materials. They first listen to the lecture, because in this way they learn about what the teacher thinks is really important in the reading materials. For the lecturer teaching is the job, but for the students the job is passing the examination, composed by the teacher. Therefore, they must inform themselves about what the teacher may ask.

Teachers, sometimes annoyed by the 'lazy or passive behaviour' of students who are not well prepared in class, may react in different ways. They might use different methods to 'activate' the students. They might embarrass students who cannot give answers to the questions they pose on the reading materials. The counter strategy of students is to be quiet in class and hope that you are not chosen to comment: never look the teacher in his face. Sometimes the teacher activates students by imposing obligations like giving a presentation or writing a paper on a specific subject. The counter-strategy of students will be to concentrate on the specific subject and to postpone other learning activities. Often teachers avoid a direct confrontation and will wait for the examination to see whether students learned what they are supposed to learn. Then a process of mutual waiting will develop, in which the examination will become the central part of the teaching and learning.

Student-centred

To activate the students we need a student-centred teaching technology, which is not primarily based on the expertise of the teacher, but on the interest and ambition of students. Students are not 'empty'; they are prepared to invest a considerable amount of time, energy and money because they expect a pay-off in terms of personal development or career chances. A student-centred technology is based on the demand side of teaching, that is, on learning. The teacher becomes a facilitator in a learning process partly directed and controlled by learners. The learning process in a student-centred environment does not begin with a presentation of 'answers' (textbooks, articles), but with recognisable questions or problems taken from real-life situations.

To many this may sound as an unrealistic fairy-tale. However, student-centred technologies do exist as a matter of fact. There even exists a University Network of Innovative Student-Centred Education (UNISCENE).[1] Problem-based learning, as it has been developed in medical education, is the best example of this type of type of educational technology. Moreover, it might fit our purpose very well, as it is designed for 'learning to learn' and for finding solutions for problems.

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[1] In this network, launched in 1996, participate Aalborg Universitet (DK), Linköpings Universitet (S), Roskilde Universitet (DK), University of Salford (UK), Universitetet i Tromsø (N), Universiteit Twente (NL) and Universiteit Maastricht (NL).

Problem-based learning

The idea behind problem-based learning (PBL) is that the starting point for learning should be a problem, a query or a puzzle that the learner wishes to solve (Boud, 1985: 13). The student work on a problem is explicitly used to get students themselves to identify, and search for, the knowledge that they need to obtain in order to approach the problem. This turns the usual approach to problem solving in university programmes on its head (Moust, 1997: 48ff). In the usual approach it is assumed that students have to have the knowledge required to approach a problem before they can start on the problem. In a PBL setting the knowledge arises from work on a problem. The emphasis, thus, is not on the teacher presenting knowledge, but on the student solving problems. It is not simply the addition of problem-solving activities to an otherwise discipline oriented curricula, but a way of conceiving of the curriculum which is centred around key problems in professional practice (Boud & Feletti, 1991: 14). Students learn how to get and select relevant and reliable information, and how to use it in solving a problem. In this way students acquire problem-solving skills and the knowledge acquired will be better applied to new situations.

Origins in medical education

Problem-based learning as it is known today, had its origins in medical education. It was first developed in the 1960s and 1970s at the medical school of McMaster University in Canada (Barrows & Tamblyn, 1980). Criticism on the conventional medical education was an important reason for redesigning the curriculum. Medical science had evolved into a finely branched network of highly specialised fields. The traditional curriculum reflected this trend of specialisation. In the first years the groundwork of 'basic disciplines' was laid. In later years students were confronted with separate courses in the major field (De Graaff, 1993). There was dissatisfaction with the conventional curriculum for several reasons. First, in the conventional programme there is the pressure to provide comprehensive coverage of the content of all disciplines basic to medicine. Second, the pre-clinical years were made up of endless lectures by a parade of faculty and the need to memorise endless facts for their own sake just to pass examinations that ask for regurgitation of memorised facts. Most curricula, not only of medical schools, ask students to memorise incredible amounts of information to survive. Finally, once in medical practice, students had problems in connecting memorised, disciplinary knowledge with concrete patient problems. At the same time students were expected to become independent thinkers, professional problem solvers, able to learn new information when they need it. The answer of Howard Barrows, the founding father of problem-based learning, was to design a curriculum that helped students to develop the reasoning process used by physicians in their practice (Barrows & Tamblyn, 1980). Therefore he utilises problem simulations that present actual patient problems in the same manner that occurs in practice. The sequence of behaviours required of the student as they work with patient problems and carry out self-directed learning is the same sequence of behaviour that is required in clinical practice. The patient problems selected in the curriculum represent the kinds

of problems that will appear in practice. According to Barrows problem-based learning is in fact practice-based learning (Barrows, 1994).

The defining characteristics of problem-based learning in medical education are the practising clinical reasoning skills with the help of carefully designed patient problems. In developing his educational method Barrows could rely on research showing that experienced physicians, when encountering a difficult or complex problem, use a specific 'hypothetico-deductive' reasoning process to solve a problem. Much of this reasoning activity occurs quickly and almost unconsciously in the thinking of experienced physicians. These reasoning skills include:

- the generation of multiple hypotheses
- using the hypotheses as a guide, carrying out an inquiry to obtain more information that will support or weaken the hypotheses considered
- coming to a decision about diagnosis and management
- reflecting about your own thinking.

Proliferation

By the late 1970s problem-based learning had spread world wide, initially in medical education and related areas but later in other professional fields like Mechanical Engineering, Social Work, Architecture, and others. Maastricht University, founded in 1976, adopted the problem-based learning approach to teaching in all of its educational programmes, that is, in Medicine, Health Sciences, Economics and Business Administration, Law, Psychology, Liberal Arts and Science. In order to use this originally medical approach in other professional fields, the concept of problem-based learning was somewhat changed and extended. In the Maastricht model it is assumed that problem-based learning is a form of constructivist learning. Students are engaged in constructing theories about the world, represented by the problems presented. They do so collaboratively and in meaningful context provided by the same problems. Unlike other authors (Barrows and Tamblyn, 1980; Boud and Feletti, 1991; Barrows, 1994) my Maastricht colleagues Schmidt and Moust (forthcoming) do not emphasise problem-based learning as a method of acquiring professional reasoning skills. In their view, problem-based learning is, first and for all, a special way of acquiring subject-matter knowledge of a domain. How does the Maastricht approach work?

Education at Maastricht University is problem-based and multidisciplinary. Curricula are not a sequence of mono-disciplinary courses but are based on a sequence of problems. Problems are frequently taken directly from real life and presented as cases, arranged around themes, and studied in modules that last between 6 and 8 weeks. By working on these problems and cases in small groups, students discover those areas in which they need to acquire more knowledge. Academic staff, libraries and various other learning resources that have been specially developed for this method are available for their subsequent individual learning activities. The initiative, however, lies with the students. Working with this method, students recognise the importance of interdisciplinary knowledge for solving problems. They learn how to obtain information from different disciplines and how to integrate this information efficiently in order to acquire new knowledge. In addition to the acquisition of knowledge, the students are also trained in a variety of skills, ranging from diagnostic or therapeutic skills for medical students to

negotiation techniques for law students (Spoormans, Cohen and Moust, 1991).

Maastricht experience

How does this work in practice? Each year of study is divided into several modules. During each module or block, students deal with a certain theme, for instance 'fatigue' for medical students or 'financial markets' for students of economics. Lecturers, often representing different departments, prepare together a 'block book'. The block book contains carefully selected problems, presented as cases and assignments on how to tackle these problems. The students meet twice a week in small groups of 8 to 12 students together with a 'tutor', a staff member who guides the group process but who does not give answers to the problems automatically: that is up to the students.

The students will normally tackle the cases according to a seven-step process that is based on the empirical cycle: the so-called 'Seven-step approach'. The students start by clarifying difficult terms or concepts (1) and then define the problems to be tackled (2). By brainstorming ideas, the group draws up an inventory of the relevant knowledge they already possess (3). In analysing the problems (4) the group encounters issues which they will need to clarify; this leads to the formulation of their learning objectives (5). During the next few days, the students select and study relevant literature (6). The result of their studies are reported (orally) by individual students and discussed by the group at its next meeting (7). The group and the tutor then decide whether the problem has been adequately solved or whether more in-depth study is called for.

The Seven-step approach of problems is crucial in the Schmidt & Moust conception of problem-based learning. They consider the attempts made by the students to make sense of the phenomena or events described in the problem, as a process of theory construction, comparable to the process in scientific research. While discussing the problem, students engage in formulating a theory that may explain the phenomena or events presented to them. As students are not supposed to prepare themselves prior to encountering the problem in the group tutorial, they construct a theory on the basis of prior knowledge, common sense and logical thinking. Prior knowledge mobilised by one participant tends to activate previously more difficult accessible knowledge in another participant. Not only activation takes place, learners also begin to elaborate on what they know and try to build bridges between their knowledge and the phenomena described in the problem. The attempt to account for the problem may lead to a first reconstruction of what they know; to the emergence of a new problem-oriented knowledge structure. The discussion in the small group will help students to perceive lacunae in their knowledge and will motivate them to search for additional information. The issues in need for further clarification are taken as cues for self-directed learning activities. Upon returning in the group, the new knowledge acquired is applied to the problem at hand to check whether the explanatory theory constructed can better deal with the phenomena presented, than the original ideas produced during the previous session. Conceptualised in this way, problem-based learning is the collaborative construction of coherent mental models of knowledge. It is also a

form of contextual learning, because principles, ideas, or mechanisms are not studied in the abstract, but in the context of a problem or situation, that can be recognised as relevant and interesting. It may resemble future professional situations, but not necessarily.

Discussion

The problem with the Schmidt & Moust interpretation of problem-based learning is its ambivalence. On the one hand it is derived from the professional practice in medicine. On the other hand it is presented as a general model of learning as such. This implies, that problem-based learning can be applied to any curriculum ranging from science and engineering to philosophy and liberal arts. There are two objections against this interpretation. The first objection concerns the constructivist conception of learning. The second objection is related to the differences of professional practice of physicians versus the professional practice of professionals in public affairs and public management.

Constructivist learning

Historically, problem-based learning is based on the 'hypothetico-deductive' approach of practising physicians. Schmidt & Moust underline the similarities of this approach with learning as such. In their conception learning is the individual construction of knowledge and competence. Knowledge and competence are, as Poikela & Poikela (1997: 14) argue, regarded as complicated networks of knowing, rather than separated pieces of information. It is assumed that learning always occurs in a context of former learning and knowledge, and that learning is directed from the inside of the learner and not from the outside. Self-directed learning might be a powerful method of learning, but it is not necessarily always the most effective. For example, getting rid of older false ideas or beliefs might be more efficiently done by confrontation with an outside, expert-teacher. Suppose we have a curriculum with the following learning objectives (cf. Drinan, 1991):

1. Developing the ability to make decisions (solve problems)
2. raising awareness of the complexity of real-world issues
3. motivation for learning through the use of professionally relevant material
4. developing the capacity for self-directed learning
5. the acquisition of, or exposure to a body of knowledge
6. developing the ability to extend learning beyond the presented situations or problems
7. generating the desire and ability to think deeply and holistically
8. encourage a search beyond one's own preconceptions
9. generating the desire and ability to reflect on the conceptual structure of knowledge.

The technology of self-directed, problem-based learning is more effective and efficient for the purposes 1 to 5 above, where the desired or attainable end-point is the acquisition of relevant information and its organisation into

making decisions, and the capacity to go on learning independently (Drinan, 1991: 317). This does not necessarily require the reflection and conceptualisation that should be involved to attain the full set. Reflection on and conceptualisation of any experience, be it contrived or real, be it problem or opportunity, should involve a depth and breadth of though, which might be achieved better by some form of expert-guided learning.

Professional practice and competences

In the conception of Schmidt & Moust problem-based learning can be detached from the professional competences and practices, although the model developed out of the medical professional practice. In my opinion the model is suited for the medical practice, but not for other professional practices like, for example, public affairs. Let me elaborate my point by comparing the competences of physicians with public affairs.

First, the physician is working and making decisions alone. The public manager will work in a team with a division of labour.

Competences	Physicians	Public affairs professionals
decision making and problem solving	Alone	in a (project) team with a division of labour
'customer'	Patient, not knowing what his or her problem is, expects to be cured	an authority or client defines the problem (be it vague or contradictory) and expects a specific deliverable (product, service, plan or process)
standard working cycle	Very short (ten minute visit of a patient)	long cycle (ranging from a few weeks to several months)
core activities	Diagnosis and management	composing a 'product' that satisfies the needs and requirements defined by the 'customer'
core competence	to put the right diagnosis	to deliver the right contribution in a common effort

If we now compare these descriptions of competences with the Schmidt & Moust model of the Seven-step approach, then the medical bias springs in the eye. First, though working in a tutorial, every student is expected to do the same thing. They are not expected to divide up the labour and are certainly not trained to do so. Second, the working cycle is short, they handle about two problems a week. Complex problems are reduced to a number of separate problems. The text of a standard task in a Maastricht 'block book' is seldom longer than half a page. The core activity of a standard task is to discover what the problem is and how it can be explained.[2]

In summary, a programme in (European) public affairs should integrate both students-centred, problem-based learning on the one hand, and expert- or teacher centred learning on the other, each method contributing to de

[2] Typically, in most Maastricht curricula the training in presenting and writing is done in separate courses, called 'practicals', and not in connection with problem-based learning.

developments of specific capacities and competences. Secondly, we should develop a new, less medical biased, model for problem-based learning, based on the features of a professional practice in public affairs.

Integrated curriculum

Modules

The Maastricht Master's in European Public affairs offers an integrated curriculum on the basis of different educational methodologies. The programme consists of six modules in succession. Each module takes six weeks of teaching and closes with an examination in the seventh week. A module deals with a specific theme, problem or set of problems. During the year the programme's attention shifts from macro to micro, from an understanding of context and process to practical and real world exercises.

The modules I and II are related to the main variables in the political and societal environment of European affairs and policy problems. The first module concentrates on politics and governance in Europe, the second on culture and organisation in European civil societies. These modules deal with the political and societal landscapes of Europe.

The modules III and IV of the programme concentrate on processes. The emphasis is on the different ways things are done in Europe and in European countries. In module III the students learn how to analyse and compare public policy processes in European countries. In module IV the policy process of the EU and its relation to the national policies is considered.

The last two modules are more directly practice oriented. Students are confronted with problems of the type 'which course of action is best?' rather than 'which hypothesis is true?'. The students are confronted with real life situations and then asked 'what would you do or advise?'. The concluding module VI is based on the 'real clients, real problems' formula.[3] Students are asked to find solutions for problems defined by business connections or government agencies. These organisations are also asked to supply the students with information and to give their opinion about the solutions offered by the students. In module V students have the opportunity to concentrate on a specific field or sector, related to their former education or future career, to prepare themselves for the practical exercise in module VI.

Components

Each module is made up of four components, each with a specific purpose and educational format: the workshop, expert seminars, skills training and guest-lectures.

Workshop

The educational format of the workshop is student-centred and based on collaborative and problem-based learning. The most distinctive feature of

[3] This formula is also used in the graduate program in Policy Analysis and Public Management of the Terry Sandford Institute of Public Policy, Duke University (NC)

problem-based learning is that students work on a problem that requires them to identify, and search for, the knowledge that they need to formulate solutions. The emphasis, thus, is not on the teacher presenting knowledge, but on the student solving problems. The objective of the workshop is to practice self-directed learning under the guidance of faculty members. For knowledge acquired at the university to be recalled and applied to solve problems in European and public affairs, these skills must be acquired in the context of working with policy problems from the first day of the Maastricht Master's. Because problem-solving is the context in which the skills and information will be needed in by the students as they work as a public affairs professional.
In the Workshop students learn to solve problems by informing themselves and by reflection on the process of acquiring and assessing information. Besides, the students develop skills that include:

- work in a multinational groups and deal with group dynamics,
- collect highly focused data,
- write memos and reports
- develop and conduct oral briefings,
- operate under tight deadlines and with incomplete information,
- accept and provide criticism and use it.

In the problem-based learning environment students play a very active role in acquiring subject knowledge. They explain to each other the principles, theories or rules involved and the reasons why they are relevant to the events described in the problem assignment. The students are more or less each other's teachers. However, students need support in order to adequately analyse problems and to be able to synthesise the relevant information. For this reason, each small-group tutorial is coached by a faculty member.

Seminars

Besides the Workshop each module contains two seminars, in which an expert teaches about facts, concepts or theories, that students need to know to participate adequately in the Workshop. In this way students working on problems will be informed about conceptual and theoretical frameworks, as well as the latest research findings. This helps students to reflect on their own presuppositions and to relate their work on a particular case to general perspectives and developments.

The teacher-expert is a faculty member or an outside expert, mostly from a specific academic discipline or from a specific field of professional expertise. Each seminar meets once a week for two hours.

Skills training

The skills training includes computing, giving presentations and memo writing, as well as budgeting and negotiating. Skills training is based on instruction and learning by doing. The specific skills to be acquired in a module are related to the theme or problems of that module.

Guest-lectures

The series of guest-lectures is designed to bring students in contact with outstanding researchers or professionals from the real world of European

public affairs.

The Maastricht Master's integrates a student-centred and problem-based teaching technology with more conventional teacher-centred lecturing. In this way we hope to get the best of both worlds.

'Project-based learning'

The objective of the European Public Affairs programme is to help graduates developing their competences to work in public organisations with European or international missions. These graduates may also work as managers and staff analysts in non-profit organisations, in public affairs divisions of private corporations, in private firms performing 'privatised' government functions and in consulting firms. In these environments the public affairs professional will process information in collaboration with other professionals in projects. If problem-based learning is understood as 'practice-based learning', the structure of project work and project management techniques can be used to simulate the professional practice of, for example, a consultancy company. The students are supposed to act as members of staff of EPA Office, an agency in the field of European Public Affairs.

In order to enable students to direct their own (learning) activities, they follow a specific procedure when a new project assignments comes in. This procedure consists of four steps:

1. Analysing the Project Mandate
2. Developing the Project Plan
3. Doing the Project
4. Completing the Project.

1. The Project Mandate

Every project in the professional public affairs practice begins with an idea, initiative or request. The idea can be elaborated, derived from another project or just an oral request from an authority or customer. This information is called the Project Mandate and includes the reason for the project and the expected result. In our learning environment the Project Mandate is a document that conveys the purpose and requirements of the project to the project team. The Project Mandate defines

- what the customer expects from the project
- where the projects starts and ends, and
- what the customers criteria for acceptance are.

A key term here is the 'deliverable'. A deliverable can be a report, a presentation, a service, a process, or a plan. Anything produced for the customer of the project is a 'final deliverable', for example the End Report. Anything produced along the way is an 'interim deliverable' or 'milestone'. It is the responsibility if the teaching staff, acting as the customer or principal, to create the Project Mandate.

The teacher, who acts during the project as an 'agent' of the principal, circulates copies of the Project Mandate to the students. After a (short) break – in order to read the materials – the teacher chairs a meeting of all project

team members, not yet divided in project teams, on the project scope. The meeting concerns a general discussion on the objectives, deliverables, and customers of the project, as well as the customer's expectations for the final deliverables. If team members have a clear understanding of the project scope, they will be better able to satisfy the customer. The teacher watches that the students will sufficiently

- identify who will use the final deliverables of the project ("who is the customer?")
- determine what problem the customer wants to solve by using the final deliverable ("What is the customer need?")
- find out if the customer is looking for specific features in the final deliverable, or has defined specifications ("What are the customer requirements?")
- identify and list the final deliverables (a project usually has only one or two final deliverables).

During the discussion the students may ask questions about the concepts used or mentioned in the Project Mandate in order to clarify the customer needs or requirements. The teacher, acting as an agent, may give clarifications or additional information to prevent students from going into the wrong direction or to bring them on the right track. Sometimes, however, the concepts used in the Project Mandate are deliberately vague or contradictory. What does the customer mean by "really democratic", or "substantive influence on policy makers"? The teacher might simulate not to know what the ideas, specific needs or requirements of the customer are. In that case the teacher delegates this task – directly or indirectly – to the project teams. It is then up to the project team to define or clarify. Actually, these definitions and clarifications will become interim deliverables for the project.

In order to check whether the students are aware of specific complications or backgrounds the teacher may also ask questions or start a discussion. If there are some options in which the final deliverable will best satisfy the customers' needs and requirements, the teacher instructs the teams to determine the final deliverable of choice. It is up to the project teams to determine whether they write a report or a plan, or give a presentation.

At the end of the first meeting the students divide up in project teams. Each team consists of three to five students, depending on the complexity of the project involved. A more complex project requires more people. To prevent free riding of individual students teams should be too big.

2. Developing the Project Plan

In order to execute the project successfully the project team writes a Project Plan, containing a plan and schedule of activities, as well as an assessment of the risks. The Project Plan has to be approved by the teacher before it is implemented.

The Plan describes what the team plans to produce (the interim and final deliverables) and what information or resources are needed. Planning involves organising a project in a logical order, identifying and defining the work activities in such a manner that they will help achieve the project objectives (Spinner, 1997). The advantage of using the planning process is that it allows more than one person's contribution to its development.

The planning of a project begins with expanding on the project objectives, as described in the Project Mandate. These objectives include (1) when the

project has to be completed , and (2) the expected results. Planning can be the most time-consuming phase of the project. However, the time spent can also be the most rewarding ("a stitch in time, saves nine"). Planning a project will follow these steps:

- *State the objectives.* The Mandate identifies the objectives of the project, but it may not provide enough detail on the features of the final deliverables. It is the team's job to write a detailed description of the final deliverables so that the teacher has a complete picture of what will be produced. State the objectives as 'SMART' as possible: Specific, Measurable, Acceptable, Realistic, Time-bounded (Hendriks, Onna & Schraven, 1997).
- *Define the criteria for acceptance.* The Mandate contains some criteria, but the list may not be complete. If not, add the necessary detail about a specific criterion, or add additional criteria to the list.
- *List interim objectives* (or milestones).

The Project Plan also contains a schedule. The value of creating a schedule is to provide team members with a means to co-ordinate their activities so they may meet their deadlines. To create a schedule students

- list the activities that must be done to complete the project
- divide activities into tasks to be performed by team members
- determine when each activity will be completed and who will be responsible to carry it out
- create a visual overview of the project that shows the major activities of the project and when they will be done.

Finally the Project Plan also assesses the risks connected with the project objectives and activities. Any project has some degree of risk (Martin & Tate, 1997). This risk includes any obstacles that could prevent the team to achieve its goal. To assess the risks the team should consider

- its capability to achieve the objectives (without considering the resources needed). Students should realise what their existing capacities are and where their limitations lie.
- the availability of resources. Students should learn to work within boundaries of scarce time, energy and other resources.

3. Doing the project

When the Project Plan has been completed and approved, the team can execute it. The time needed for doing the project depends on the size and complexity of the assignment in the Project Mandate and the objectives stated by the project team. A project may take a few days, but also several weeks. Whatever the type of project may be, students have to attend class two times a week to discuss progress and possible problems.

As the plan is being executed, the team needs to anticipate potential problems. To review the progress of the project the team should meet regularly. Monitoring the project progress gives the team a warning system for problems with the project, which allows the team to resolve them early and avoid more difficult changes later on.

In some cases the resolving of a problem may lead to changes to the Project Plan. When a change is proposed, the team decides whether or not it is a good idea. Changes to the Project Plan should be reported to the teacher.

4. Completing the project

The project ends out with a presentation of the project results and a evaluation of the lessons learned.

In their presentation or report each project team

- explains how the Project Mandate was translated in the objectives of the Project Plan
- presents the plan, information or solution as stated in the objectives of the Plan
- elaborates on the lessons learned.

Each project team presents it results to the whole group on the established finish date. In order to learn from their successes and their mistakes, each team reviews its project results by comparing the results with the objectives described in the Plan. The project closed out when the teacher accepts the project result and the group is relieved of its duties.

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Appendix 1

Examples of Problems in the various problem-based curricula of Maastricht University

Little Monsters

Coming home from work, tired and in need of a hot bath, Anita, an account manager, discovers two spiders in her tub. She shrinks back, screams, and runs away. Her heart pounces, a cold sweat is coming over her. A neighbour saves her from her difficult situation by killing the little animals using a news paper.

Explain
(From the introductory course of the psychology curriculum)

The miserable life of a stomach

The protagonist of our story is the stomach of a truck driver who used to work shifts and smokes a lot. The stomach developed a gastric ulcer and so the smoking stopped. Stomach tablets are now a regular part of the intake.
While on the highway in Germany, our stomach had to digest a heavy German lunch. Half an hour later, a severe abdominal pain developed. The stomach had to expel the meal. Two tablets of acetyl acid were inserted to relieve the pain (the truck driver had forgotten his stomach tablets!).
A second extrusion, some hours later contained a bit of blood. In a hospital in Munich an endoscope was inserted. The stomach needed to be operated upon the near future.

Explain
(Adapted from a course on abdominal complaints, Medical curriculum)

Free and fair elections?

Today, no one seriously opposes the principle that all men and women have the right to vote. In all European states free and fair elections and majority decision making are considered basic elements of the political order. That is the theory. But in practice the world seems different.
First, in Britain the Conservative Party was able to achieve overall majorities at four elections in a row, thus entitling it to govern alone for eighteen years, without ever winning more than 44 per cent of the votes.
Secondly, there are differences in how votes are converted into seats in parliament. For example, the British Liberals and Social Democrats won 22.6 per cent of the votes in the 1987 general election and received just 3.4 per cent of the seats, returning to Westminster as an insignificant group in a small corner of the opposition benches; in the Finnish election of the same year, the Social Democrats won about the same share of votes (24.1 per cent), yet they not only received 28.0 per cent of the seats in the new parliament but also emerged as the leading party in the coalition government formed forty-five days after the election.
Explain.
(from a imaginary curriculum in political science)

MINISTRY OF INTERIOR
REPUBLIC OF TRANSDANUBIA

Appendix 2

August 9, 1999

Dear Sir or Madam,

I am writing you on behalf of the Minister of Interior of the Republic of Transdanubia. His Excellency would like to have your advice on a burning question of political reform.
The transition to democracy in Transdanubia in 1990 was accompanied by the introduction of multiparty government. This, however, only required a slight revision of the old Constitution. In the 1990s politics in Transdanubia therefore evolved within the revised communist framework. The societal support in favour of the existing political system declines rapidly, it seems. More and more people distance themselves from the old form of government and its regime. Especially after the (second) electoral victory of the united non-communist parties in 1998 the demand for a firm break with the old order and its reminiscences rose. In response to criticism in society at large the Minister of Interior would like to come up with a proposal of political reform. This reform should consist of, firstly, a clear break with the old political order, as it was modelled on communist constitutional ideas. Secondly, the reform should entail the introduction of a truly European democratic system. As the Republic of Transdanubia has the ambition to become a Member of the European Union, its political system should be fully compatible with the institutional architecture of the other European democracies.
The new political system should make our political institutions European, modern and stable. We would like to have your advice on the institutional reform of the Executive, the Legislature and, especially, the electoral system. The question of the Judiciary was already settled in the first part of the 1990s. We would like to receive your advice September XX 1999 at the latest.

Sincerely Yours

Dr. K. Lanosz
First Secretary of the Cabinet of the Minister of Interior
of the Republic of Transdanubia

5 PANALOTTI STREET • BAKUNY
TEL.: +31 43 388 3449 • FAX: +31 43 321 0498

The Republic of

TRANSDANUBIA

Transdanubia is a landlocked republic in central Europe. Its present borders are virtually the same as those established after World War I and the fall of the Hapsburg monarchy. The country's capital and largest city is Bakuny.

Land and Resources

Transdanubia has a total land area of 293,030 sq. km. The country is somewhat oval in shape, with a maximum distance from east to west of about 720 km and a maximum distance from north to south of about 315 km.

Natural Resources

Transdanubia's principal natural resource is bauxite, the ore from which aluminium is made. The country also has deposits of coal, petroleum, natural gas, manganese, uranium, and iron ore. Reserves of most minerals are small, however, and often of low quality. The alluvial soils of the Great Transdanubian Plain are highly fertile, although inferior to the black earth in the south-eastern and southern plain. Northern Transdanubia lacks sufficient water, especially between July and October, when precipitation levels are typically low.

Population and Settlement

The population of Transdanubia (1995 estimate) is about 22,471,000. About two-thirds of the people live in urban areas. Bakuny, the largest city, with a population (1993 estimate) of about 2,009,000, is the capital and also the cultural and economic centre of Transdanubia; its many industries include metalworking. Other major cities include Bredocen (317,000), the trade centre of a major agricultural region; Kolmis (291,000), the location of iron-and-steel and other metallurgical industries; Gedesz (179,000), a centre for the agricultural products of the Great Transdanubian Plain, also noted for its chemical and synthetic-textile industries.

Way of Life

Despite large-scale urbanisation in the area surrounding Bakuny, Transdanubia is best characterised by its rural nature. Fewer than ten cities have a population of more than 100,000, and even the largest of these cities have maintained a rural character. Cities are surrounded by village-type settlements with scattered multilevel apartment buildings. Most Transdanubians live in single-family housing. Transdanubia has an unusually high number of commuters who travel from poor regions to jobs in the cities. More than half of the population pursues agriculture in addition to their main occupation. Transdanubia has high levels of consumption of goods and services, as compared with other former Communist countries. Still, in the early 1990s living standards fell for most of the population as a result of the country's economic transition. In the mid-1990s about one-fourth of the population was living at or below poverty level. While life for many of these Transdanubians revolves around finding the resources necessary to raise a family, there is also a distinct upper class who lives in large houses with swimming pools and tennis courts.

One of Transdanubia's most pressing social problems is the high incidence of alcoholism. Despite the constitutional guarantee of civil liberties and human rights, several minority groups have suffered from discrimination and persecution in recent years; this has been attributed in part to economic frustration resulting from the transition to a capitalist system.

Economy

Before World War II, the economy of Transdanubia was based primarily on agriculture. What little industry the country had was almost entirely destroyed during the war. After the Communists took power in 1948, the Transdanubian government took control of the economy and set forth a series of long-range economic development plans in which the emphasis was on industrialisation, particularly the development of heavy industry. However, these plans were not well matched with Transdanubia's resources and capabilities, and the new industries were not able to meet the government's high production goals. In the late 1950s and 1960s the government was forced to readjust its plans and place more emphasis on agriculture and the manufacturing of consumer

goods. In 1968 the government introduced an economic reform program known as the New Economic Mechanism (NEM), which allowed for limited decentralisation of the economy.

As the economy continued to decline throughout the 1980s, Transdanubia began turning to Western nations for trade and economic assistance. At the same time, the government began to encourage the formation of private businesses and partnerships with foreign companies. When non-Communists came to power in 1990, the country accelerated the pace of free-market reforms. The government was particularly successful at attracting foreign investment, and by 1993 Transdanubia accounted for almost half of all direct foreign investment in Eastern Europe. Numerous state-owned companies were transferred to private ownership as part of a widespread privatisation program, and by 1993 the private sector's share of gross domestic product (GDP) was about 50 percent. When socialists regained the majority of parliament in 1994, the pace of privatisation and other economic reforms slowed.

The collapse of Communism and resulting decline in industrial production displaced a significant percentage of workers. In 1993 the unemployment rate stood at 13 percent; by the end of 1994 it had dropped to about 10 percent. In the early 1990s 38 percent of the labour force was employed in industry; 19 percent worked in farming, forestry, or fishing; and 43 percent in service industries.

In 1992 a labour code was enacted, which recognised the right of workers to associate freely and to organise and bargain collectively. With the exception of military personnel and the police, workers also have the right to go on strike. Following the introduction of this code, the number of strikes in Transdanubia increased dramatically; most were of short duration, however. The largest union federation is the National Confederation of Transdanubian Trade Unions, which claimed approximately 1 million members in 1993.

Government

Between 1948 and 1989 the Communists controlled all levels of government in Transdanubia, and the head of the Communist Party was the country's most powerful leader. In the late 1980s public pressure forced the country's leaders to accept the formation of opposition parties. In 1989 the Communist Party ended its monopoly on power, and renamed itself the Socialist Party (SP). Soon afterward, the parliament revised the 1949 constitution to create a multiparty system. Multiparty elections were held in 1990, and the Transdanubian Democratic Alliance, a coalition of non-communist parties, won the majority of parliamentary seats. In subsequent elections held in May 1994, the Socialist Party won control of parliament. In the 1998 general election the non-communist alliance regained a large majority in parliament, thanks to the majority system, though the coalition seems to break up due to competition between the coalition partners.

Executive

Transdanubia has both a president and a prime minister. The president acts as head of state. He or she is elected by the National Assembly for a four-year term, and may be re-elected for a second term. The prime minister is typically the leader of the party with the most seats in parliament.

Legislature

Transdanubia has a one-house parliament called the National Assembly, consisting of 386 deputies, elected for four-year terms from local districts.

Judiciary

Transdanubia's highest court is the Supreme Court, which functions mainly as a final court of appeals. All judicial positions are by election. Supreme Court, county court, and district court judges are elected for indefinite periods. The president of the Supreme Court is elected by the National Assembly. The chief public prosecutor, who is nominated by the National Assembly, is responsible for ensuring observance of the law. Judges are not permitted to join political parties or engage in political activities. The Civil Code and the Criminal Code adopted during the Communist period are still in force. A constitutional court was established in 1990.

Political Parties

From 1949 to 1989 the Socialist Workers' Party (SWP) dominated the nation's political life. In October 1989, with its membership rapidly declining, the SWP reconstituted itself as the Socialist Party (SP). The constitutional revisions adopted in 1989 officially legalised the formation of other political parties.

The most popular party in Transdanubia is the SP, which won about 33 percent of the vote in the 1994 elections for the National Assembly. Other parties include the Alliance of Free Democrats, which received about 20 percent of the vote, the Democratic Forum (about 12 percent), the Independent Smallholders' Party (about 9 percent), the Christian Democratic People's Party (about 7 percent), and the Federation of Democrats (7 percent). In de 1998 general election the SP won 27 percent; the former Alliance of Free Democratics split into the Free Liberals (7 percent) and the Democratic Party (15 percent); the Democratic Forum allied with the

Federation of Democrats and got 23 percent. The Christian Democratic Party won 7 percent of the vote and the Independent Smallholders' Party 11 percent.

International Organisations

Transdanubia is a member of the United Nation (UN), the Council of Europe, and the Organisation on Security and Co-operation in Europe (OSCE). The country also participates in the Visegrad Group and the Central European Initiative, both of which were founded to promote co-operation in the region after the end of Communism. Transdanubia became an associate member of the European Union (EU) in February 1994 and is currently seeking full membership.