ICT in Legal Education

By Antoinette J. Muntjewerff[*]

A. Introduction

The Bologna Declaration (1999) started a process of reforming European higher education. The major aim of the declaration was to construct a single European Higher Education Area by 2010,

> "..through increased compatibility and comparability of higher education systems in order to facilitate internal mobility for students, graduates and higher education institution staff members, but also to make European higher education more recognisable and attractive to students and scholars from outside Europe."[1]

The introduction of the bachelor-master system should give an impulse for curriculum innovation, where the idea was that more joint education projects between higher education institutions would emerge. Also prominent in the introduction of the bachelor master system was to improve student mobility.

The key concept in the Bologna process obviously is 'internationalisation'. However, it appears that one of the major tools in achieving this aim, being the use of Information and Communication Technology (ICT) has been ignored.[2] ICT can be used to support the educational content, the educational process as well as the organization and administration of education.

The use of ICT in education is often referred to as e-learning. The European Committee defines the concept of e-learning as:

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[1] *See* WESTERHEIJDEN ET. AL., NEW DEGREES IN THE NETHERLANDS. EVALUATION OF THE BACHELOR-MASTER STRUCTURE AND ACCREDITATION IN DUTCH HIGHER EDUCATION 53 (2008).

[2] *See* WESTERHEIJDEN ET. AL (2008); KRISTEN, EVALUATIE VAN HET BACHELORPROGRAMMA VAN DE FACULTEIT DER RECHTSGELEERDHEID VAN DE UNIVERSITEIT VAN AMSTERDAM (2006); FRENKEN ET. AL., INTERNATIONALISERING, ONDERWIJS EN ICT IN LEIDEN. ICLON RAPPORT NR 149 (2005); ICT IN HET HOGER ONDERWIJS (Frencken et. al. Eds., 2002).

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> "the use of new multimedia technology and the internet to enhance the quality of learning by enabling access to means and services as well as enable exchange and cooperation over distance".[3]

To define a specific use of ICT, Frencken, Smits & Wisbrun developed a model for internationalization and education. Their recommendations for enhancing internationalization included pilot projects for on-line cooperation between students from different universities, technical recommendations regarding the use of international standards, study the possibility of examination through the internet, and developing and exchanging content.[4]

In this paper the focus is on developing e-content for legal higher education. The HYPATIA Research Program for principled and structured design of e-content for legal education is described.[5]

HYPATIA is a research agenda and a methodology for principled and structured design of material for learning law effectively and efficiently.

The HYPATIA research is interdisciplinary, which applies findings from researches on learning and instruction, computer science, and legal science (Figure 1). In addition, the HYPATIA research contributes findings to these fields as well.

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[3] GUTIERREZ-DIAZ available at: www.elearningeuropa.info

[4] *See* FRENKEN ET. AL (2005).

[5] The research program is named after Hypatia of Alexandria. Hypatia had a passion for knowledge. She traveled widely and corresponded with people all over the Mediterranean. She taught mathematics and natural philosophy. She is credited with the authorship of three major treatises on geometry and algebra and one on astronomy. She invented several tools: an instrument for distilling water, an instrument to measure the specific gravity of water, an astrolabe and a planisphere. *See* MARIA DZIELSKA, HYPATIA OF ALEXANDRA (1995).

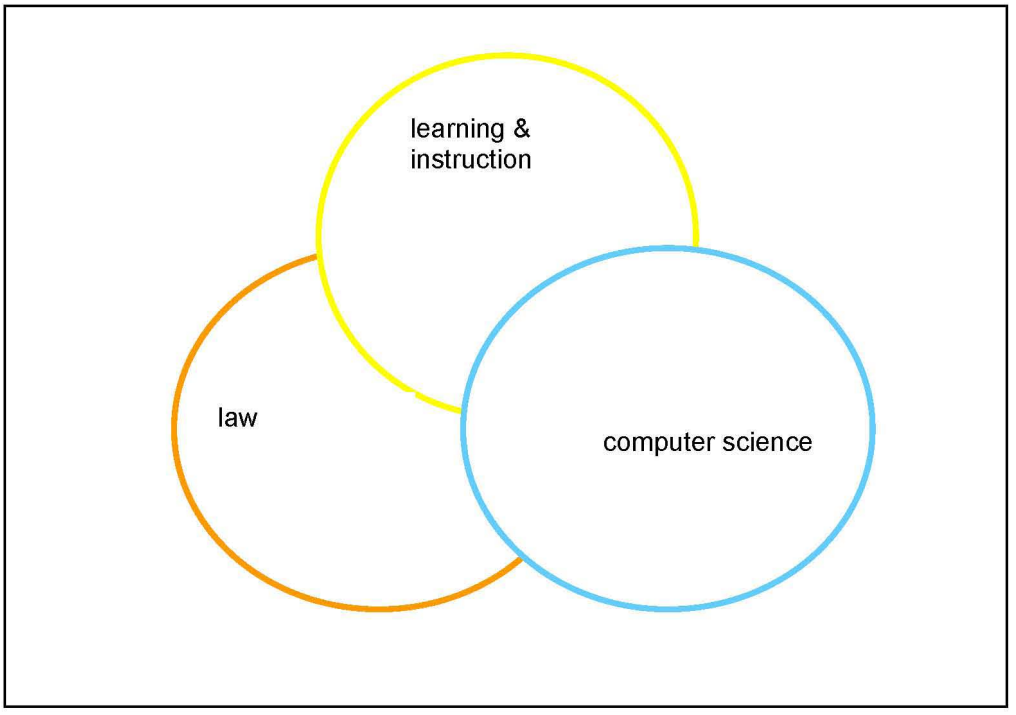

Figure 1: An interdisciplinary field

The aim of the HYPATIA research is to design electronic materials for law students to learn law[6].

B. Electronic legal education

Electronic legal education involves the use of information, communication and instructional technologies to enhance students learning of law and to provide law teachers with environments and tools for teaching law.

[6] The emphasis is on institutionalized learning and instruction, being learning and instruction organized and accredited within an institution as a school or a university. Life long learning, internationalized adult education (see for instance the Grundtvig program available at: www.europeesplatform.nl) or the program 'e-learning for judges' available at: http://www.iom.fi/content/view/184/8/ are examples of learning and instruction using ICT where the learning does not take place within the organizational and accreditational boundaries of an institute.

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Since the beginning of the Eighties these types of technologies were introduced in legal education at Law schools and Law faculties in Europe. The first applications in this field were databanks of statutes and precedents; soon to be followed by computer assisted instructional programs.[7]

Although these materials are available, they are not widely used in legal education.

The situation in the Netherlands is that the available applications are either only used at the faculties that produced them or not used at all.

With the fast growth of the Internet many Law schools and Law faculties are moving their education and training into the web environment. The web environment enables a more integrated approach of using the technologies in legal education. It also enables teachers to assemble, store and (re) use materials for teaching law. More importantly, it may open new ways of teaching and learning law, for example, by providing students with an environment in which they can manage legal information and legal knowledge for their personal and professional use.

With the introduction of Electronic Learning Environments (ELO's) at the Law Faculties in the Netherlands, started around 1996, there is a growing demand for electronic materials for learning the law. There are new opportunities for (re) using existing applications and designing new electronic materials.

To transform these expectations and possibilities into electronic materials for the effective and efficient learning of law requires a principled and structured design approach: the design of these materials should be based on research outcomes.[8]

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[7] *See*, HAFT ET. AL, A NATURAL LANGUAGE BASED LEGAL EXPERT SYSTEM FOR CONSULTATION AND TUTORING – THE LEX PROJECT (1987); Fokke Fernhout et. al., *OBLIGATIO: computer simulatie van juridische casus, in* LEREN STUDEREN IN HET HOGER ONDERWIJS. PERSPECTIEVEN VOOR INTEGRATI E (de Grave & Nuy eds., 1987);

George Span, *De computer als tutor*, *in* COMPUTER-ONDERSTEUND ONDERWIJS IN DE JURIDISCHE DISCIPLINE.(Beek, Boerma, & Hurts eds., 1988); TOM ROUTEN, COMPLEX INPUT: A PRACTICAL WAY OF INCREASING THE BANDWITH FOR FEEDBACK AND STUDENT MODELLING IN A STATUTE-BASED TUTORING SYSTEM (1991); VINCENT ALEVEN, TEACHING CASE-BASED ARGUMENTATION THROUGH A MODEL AND EXAMPLES (1997); ROB NADOLSKI & JURGEN WORETSHOFER, HANDLEIDING CD-ROM-PROGRAMMA ARRONDISSEMENT ZOMERWEELDE (1998); PAUL MAHARG, THE DELICT GAME (1998); ANTOINETTE MUNTJEWERFF, AN INSTRUCTIONAL ENVIRONMENT FOR LEARNING TO SOLVE LEGAL CASES. PROSA (2000).

[8] *See* Antoinette Muntjewerff, *Principled and Structured design of Electronic Materials for Learning the Law*, *in* LEGAL KNOWLEDGE AND INFORMATION SYSTEMS, 133 (Trevor Bench-Capon, Aspasia Daskalopulu & Radboud Winkels eds., 2002); Antoinette Muntjewerff, *Effective and efficient learning of the law using models of legal knowledge and legal reasoning*, *in* IN HET LICHT VAN DEZE OVERWEGINGEN 209 (Eveline Feteris, Harm Kloosterhuis, Jose Plug & Jeanette Pontier eds., 2004); Antoinette Muntjewerff & Jeroen Leijen, *Unplugging Blackboard, in* KEY ISSUES IN THE DEVELOPMENT AND USE OF ICT IN LEGAL EDUCATION, 57 (Paul Maharg & Antoinette Muntjewerff eds., 2005); Paul Maharg & Antoinette Muntjewerff, *Through a Screen Darkly: Electronic Legal Education in Euro*pe, volume 36, number 3 THE LAW TEACHER. THE INTERNATIONAL JOURNAL OF LEGAL EDUCATION, 307 (2002); Paul Maharg & Antoinette

However, the research field of developing electronic materials for effectively and efficiently learning law is still in its infancy. Main reason for this is the fact that Law schools and Law faculties approach the development of instructional materials as teaching and not as research. Another reason is that the design of electronic materials for learning the law is by definition interdisciplinary and requires a close relation with both legal research and instructional research. Then there is the main difference between the Anglo-American legal system and the Continental legal system that makes the sharing of materials hard, blocking the formation of an international research community.

Finally, the few researchers in this area work rather isolated because there is no common research community. There is a need for a forum for researchers and developers of electronic materials for learning the law to define the research agenda, to be able to share research outcomes and electronic materials and to be able to apply research outcomes from relating fields such as Artificial Intelligence (AI) & Law and AI & Education to prevent re-inventing the wheel.

C. Principled and structured design of electronic materials

Principled and structured design involves three interrelated research streams: basic research, applied research and integration research (see Table 1).

basic research	*model construction*	*theoretical research*	*legal perspective knowledge*
engineering perspective		*empirical research*	
applied research	*materials construction* *remedies* *instructional model* *evaluation*		
integration	*classification* *selection*		

Table 1: Principled and structured design approach

Muntjewerff, *Key Issues in the Development and Use of ICT in Legal Education*, THE LAW TEACHER SPECIAL EDITION (2005).

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Basic research is concerned with developing well-founded models of legal knowledge and legal reasoning to be learned by law students, examining the difficulties of law students with acquiring legal knowledge and legal skills and finding remedies to enhance effective and efficient learning of legal knowledge and legal skills.

Applied research is concerned with constructing applications for learning law. A principled design approach guides the process in such a way that difficulties and mistakes encountered during the design process may be accounted for.

Integration research is concerned with listing existing electronic materials using a classification and to make applications available for (re) use, in what is referred to as a ToolBox for learning the law.
Cooperation between researchers and developers in the field of Law & Educational Technology (BILETA, LETA, ELFA, ROL) is essential for realizing well-founded applications for learning law and using them in legal education[9].

We state that these new electronic materials should be planned, designed and evaluated in a well-founded and structured way by researchers and developers from the field of Law & Educational Technology.

I. Basic research

The aim of the basic research part is to (re) construct explicit models of legal knowledge and legal reasoning to be applied in electronic materials for learning law. These models are (re) constructed by way of both theoretical and empirical research. In the theoretical research component we explore, conceptualize and specify legal knowledge and legal reasoning in order to be able to (re) construct explicit models of legal knowledge and legal reasoning.

In the empirical research component studies are carried out to acquire insight in the way legal practitioners and legal scientists handle legal knowledge and in the way they use legal knowledge given a specific legal task. Besides that, studies are carried out to acquire insight in how law students handle legal knowledge and apply this knowledge in performing a legal task. The outcomes give indications about specific difficulties in acquiring and using legal knowledge.

Within the theoretical research component two perspectives are taken: a legal perspective and a knowledge engineering perspective. The legal perspective is that different legal

[9] BILETA available at: http://www.bileta.ac.uk/
LETA available at: www.leibnizcenter.org/~munt
ELFA available at: http://elfa-afde.eu/default.aspx
ROL available at: http://www.rechtenonline.nl

sources are examined to specify models of legal knowledge and legal reasoning. These legal sources are legal empirical research, legal educational practice, legal dogmatics, and legal theoretical research.

The knowledge engineering perspective within Artificial Intelligence & Law research aims at constructing models of legal knowledge and legal reasoning. As these models have to be executed by a computer these models require a high level of explicitness.

The model-based approach is the most articulated and structured approach resulting in well-founded problem solving methods for legal tasks. The legal equivalent of the model based approach, is the model based legal knowledge engineering approach.[10] Model-based legal knowledge engineering deals with modelling legal problem solving methods and modelling legal domain knowledge. The model-based approach involves the construction of a set of models of problem solving behavior where a system is a computational realization of these models.[11]

The models serve as a specification of what a system should be able to do, that is, they are specified on the knowledge level. The abstract character of this level also requires special specification languages to be able to express the models and to communicate them.

Within the model based legal knowledge engineering approach the emphasis at the moment seems to be more on legal knowledge.[12]

The emphasis is shifted from problem solving methods to the domain knowledge in search for structures that underlie the content of legal knowledge resulting in legal ontologies. Although this is very important, what we need is an integrated and explicit description of both the problem solving method and the legal knowledge.

Within the model based approach we therefore opt for the approach that describes the construction of a model of automated legal reasoning. We are interested in using the legal knowledge in performing a legal task. We want to reveal a structure of use in the legal sources. We therefore turn to a conceptual perspective where statutes are seen as

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[10] *See* ANDRE VALENTE, LEGAL KNOWLEDGE ENGINEERING (1995); NIENKE DEN HAAN, AUTOMATED LEGAL REASONING (1996); Nienke den Haan & Giovanni Sartor, *Model-based Legal Knowledge Engineering, in* MODEL-BASED LEGAL KNOWLEDGE ENGINEERING. 1037 (Brian Gaines ed., 1999).

[11] *See* Joost Breuker & Walter van de Velde, CommonKADS library for expertise modeling. Reusable problem solving components (1994); Valente, *supra* note 10; den Haan, *supra* note 10.

[12] DEN HAAN & SARTOR, *supra,* note 10.

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artefacts constructed to perform certain functions. Such a functional viewpoint on legal knowledge is described in the functional ontology of law. [13]

As hypothesized by Valente (1995) core ontologies have a functional character and reflect the major reasoning or argument in a field. The functional perspective could be understood by the fact that fields are typically fields of practice. As a consequence, types of knowledge can be distinguished by their roles. These roles may also reflect that the predominant structure of reasoning is more speculative, but may, also, be conceived as that domain knowledge is a 'model of the system in the world' and that reasoning means some operation on this simulated system, or the construction of such a system. [14] A legal core ontology describes a coherent view on the legal domain.[15]

II. Applied research

In the applied research part, the electronic materials for efficiently and effectively learning law are designed in a principled and structured way, which implies that:

- the basic research results are used in arranging the electronic materials
- the models of legal knowledge and legal reasoning are used in the materials on the basis of insight on law student's specific difficulties in learning law remedies are constructed. The remedies are to be used in the design of the materials
- instructional design decisions are made on the basis of a global theory on learning and instruction.[16]

Thus the design process will result in a coherent and consistent instructional model and electronic materials are evaluated extensively (developmental testing and field testing).

III. Integration research

The need to be acquainted with existing tools is self-evident. However, it is necessary to come up with a classification scheme to be able to integrate these existing applications in a ToolBox. This classification is useful to make clear distinctions between types of applications and ways of realizing them. This division makes it easy to see what tools are

[13] VALENTE, *supra* note 10.

[14] William Clancey, *Model construction operators*, ARTIFICIAL INTELLIGENCE, 53, 1 – 115 (1992).

[15] See Thorne McCarthy, A language for legal discourse (1989); Pepijn Visser, Knowledge Specification for Multiple Legal Tasks. A Case Study of the Interaction Problem in the Legal Domain (1995); Robert van Kralingen, Frame-based Conceptual Models of Statute Law (1995).

[16] Summaries of 50 major theories of learning and instruction available at: http://tip.psychology.org/theories.html.

already available and what tools are still missing and needs to be constructed to fully cover all aspects of learning law.

The main idea is to have different types of electronic materials, which are needed for learning the law, available in a ToolBox. The ToolBox is then made available to law teachers and law students.

The electronic materials in the ToolBox are materials that cover a wide range of legal knowledge and legal skills. These materials help law students to become a skilled legal practitioners or legal scientists. Law students and law teachers may select the proper tools for learning or teaching. To be able to select the proper tools we also need to define selection criteria.

The proposed classification distinguishes between legal communication tools, legal information tools, and legal instructional tools (see Table 2).

- Legal communication tools are electronic materials that help to structure, organize and support communication in accomplishing a certain legal task (for instance, an online legal clinic, or legal negotiation)

- Legal information tools are electronic materials that contain legal data that are needed in order to carry out a certain legal task (for instance, databases of statutes, precedent or legal documents).

- Legal instructional tools are electronic materials needed for the effective and efficient acquisition of legal knowledge and legal skills. In short, instructional tools are electronic materials that instruct.

- With this we mean that the electronic materials are intended to support the learning of a certain body of knowledge or a certain (set of) skills. We classify instructional tools in three different categories: knowledge acquisition tools, training tools, and test tools.

- Knowledge acquisition tools are tools that support the learner in acquiring the meaning of concepts and the relations between concepts (for example, CALI modules).[17]

- Training tools are tools that use the acquired knowledge in performing a legal (problem solving) task.

[17] CALI available at: http://www.cali.org

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- Test tools are tools that present the learner with assignments to test her knowledge and performance.

electronic materials for learning the law	legal communication tools		
	legal information tools		
tools/guiding systems	legal instructional tools	knowledge	acquisition
		training tools/coaching systems	
		test tools	

Table 2: Classification of electronic materials for learning the law

D. Coaching systems

Most of the existing legal instructional materials are training tools or, as they are referred to in the AI & Education community, coaching systems.

A coaching system consists of an environment in which the student is enabled to perform the task to be learned or trained for. The coaching system monitors the activities of the student and outcomes of the student performance. It compares these with the required activities and outcomes. These systems therefore imply some normative view (as most teachers have).

A deviation is viewed as an error or inefficiency. When the coaching system encounters a deviation it subsequently diagnoses what may have caused it.

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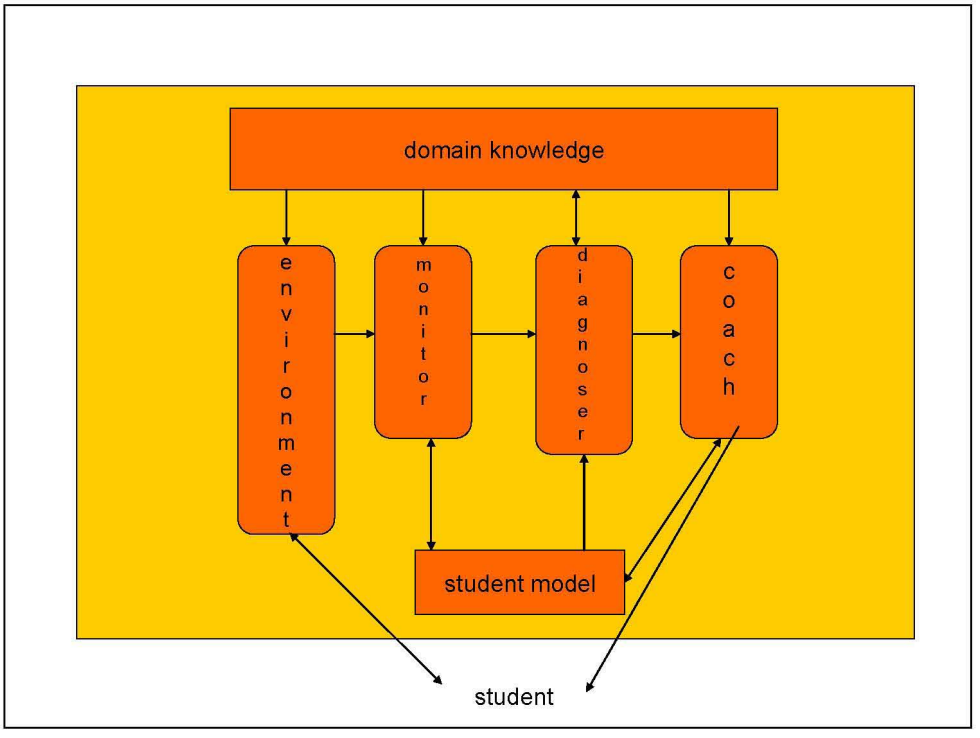

Figure 2: Coaching System

The following functional components are distinguished (Fig 2):

- An environment to enable the task to be learned or trained.
- A monitoring component to observe and interpret the student's behavior while she is performing the task and to identify that there is a deviation.
- A diagnoser to identify the cause of the deviation.
- A coach to assist and instruct the student[18]
- A student model. A repository where the information about the student is collected to built a model of the individual student.[19] The model keeps track of the changes in behavior and registers what the student is doing and how she does it.

[18] *See* Etienne Wenger, Artificial Intelligence and Tutoring Systems. Computational and Cognitive Approaches to the Communication of Knowledge (1987); Joost Breuker, EUROHELP: Developing Intelligent Help Systems (1990); Radboud Winkels, Exploring Intelligent Tutoring and Help (1992).

[19] *See* INTELLIGENT TUTORING SYSTEMS (Sleeman & Brown eds., 1982).

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Coaching systems may differ in three major factors. The first factor is the degree of similarity of the training/learning environment in comparison with the real environment. The second factor is the degree of freedom the student has in performing the task. The third factor is the degree to which a coaching system is able to "understand" what the student is doing and what her results mean. We begin with a short introduction of each of these factors, starting with the environment, followed by the coaching strategies, and the representation of the domain knowledge.

I. Environment

A task is performed in some environment. This environment defines or instantiates some problem or goal to be achieved and specifies (makes explicit) the conditions (situation) in which this problem is to be solved or this goal is to be achieved. In summary: the environment is a task environment.

For real environments coaching systems are in fact "help" systems. Here a user performs a real life task being the task to be learned or trained in the real life setting. These coaching systems present to the user the real environment, not a simulation, and offer help to the user during task performance. Help systems are almost always coupled with other interactive computer systems, for instance they may support operators that monitor (industrial) chemical processes, or they may support users of applications as word processors.

A well-known example of the latter is EUROHELP.[20] In learning to acquire skill in using an interactive computer program, the user may recognize a need for some piece of information and so she may question available help facilities.

However, a user may not be aware of having a problem. EUROHELP is a help system that has also the capability of looking over the shoulder of the user, interpret her performance and offer active help accordingly. This active side of the help system is functionally almost identical to coaching systems. There is however, a subtle difference.

In a help system the user has the initiative in selecting a task, therefore a help system is by necessity opportunistic, i.e. this means that it cannot prescribe "exercises", but is engaged in "on the job" training. A help system can get into a coaching mode by prescribing a series of training tasks to the user, this happens when help is combined with teaching.

In general, however, the environment in a coaching system is not a real environment, but a representation of reality, i.e. a simulation.

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[20] BREUKER, *supra* note 18.

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II. Coaching Strategies

A distinction is made between the environment and the coach. Where the environment simulates the problem situation that defines the task to be learned or trained, the coach sees to the learning or training of the skill to be acquired. The coach may vary on task performance that is required or allowed and, related, tutorial style.

Coaching systems vary in the degree of freedom the student has in performing the task. To start task performance the student is presented with an initial situation and a problem specification.

However, the tutorial style from thereon may vary from constrained to totally free.[21] In the constrained setting there is an explicit setting of the task. The task is differentiated into a task directed problem or exercise, the goal is stated and the sub-tasks that have to be carried out are traced. In a more free setting the student is presented with a situation. Without explicitly setting a task the coaching system asks the student to explore the environment on the basis of this situation.

Another issue here is the appearance of the coach. The coach can either be present as textual feedback and hints, or as a pedagogical agent who is present in the environment.

Research on pedagogical agents show promising applications and results. For example, the pedagogical agent Steve.[22]

The computer tutor Steve is a human like agent that collaborates with the student in a virtual world to help the student to learn[23].

This virtual world is used for training people how to perform tasks such as operating or maintaining complex equipment.

The virtual reality world provides a three dimensional interactive mock up of the students' working environment allowing her to practice tasks. The student enters this virtual reality by putting on a head mounted display.

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[21] *See* Jos van Berkum & Ton de Jong, *Instructional environments for simulations*. EDUCATION & COMPUTING 6 303 (1991); DESIGN AND PRODUCTION OF MULTIMEDIA AND SIMULATION-BASED LEARNING MATERIAL (Ton de Jong & Sarti eds., 1994)

[22] A short demonstration of Steve is available at: http://www.isi.edu/isd/carte.

[23] These human like agents are also referred to as "atavars". Using animated pedagogical agents in learning is also referred to as guidebot assisted learning. Guidebots help to keep the learner on track, interact with the students in learning environments, engage in instructional dialogue and enhance motivation.

Steve cohabits the virtual world to help the student. Steve first shows the student how to perform the task by performing the task himself, while the student looks over the shoulder of Steve. Steve also talks to the student.

He, for example, tells the student what he is going to do ("Let me show you how to perform the pre-start procedure"). Steve also watches if the student is paying attention. This is followed by the student performing the task while Steve looks over her shoulder. Steve has a specific and meaningful role in learning the task of operating complex equipment. However, this role is already somewhat less obvious in Adele.[24] Medical students are presented with a simulated patient in a clinical setting (a video presentation of real patients on the computer screen). In this case based diagnosis exercise the student has the role of a physician. The student is able to ask questions about the medical history, perform a physical examination, order diagnostic tests and make diagnoses. Coaching is provided by Adele, the pedagogical agent or tutor. Like Steve, she is an animated computer figure; not an animated video of a real human figure. Adele is depicted as a physician and she presents the hints and feedback to the student both in text and with a synthesized voice. The evaluation of Adele showed that student did not find Adele believable as an attending physician. Adele is a pseudo figure who has no specific and meaningful role other than telling the student the feedback that could also easily be presented to the student as text only. The evaluation however, showed that it is not clear if students prefer the persona to a text-only tutor. "Real life" appearance may have no beneficial effect.

III. Knowledge Representation

Coaching systems vary in the way the knowledge is explicitly represented in the system. Systems that use an implicit knowledge representation encode decisions not knowledge.[25] These systems are for that reason classified as non-intelligent. Systems that do explicitly encode the knowledge are labelled as 'intelligent'. Explicitness of knowledge representation comes in degrees.

With an explicit knowledge representation it is possible to make inferences and to give explanations on the basis of the representation.

Environment, coaching strategies and knowledge representation are distinguished as separate factors, which have specific dependencies between them. The ideal is to construct a coaching system with an explicit simulation environment and a coach with explicit knowledge about this environment, where an explanation consists of elements of that explicit representation.

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[24] Adele stands for Agents for distributed learning environments. Screen dumps of Adele are available at: http://www.isi.edu/isd/ADE.

[25] WENGER, *supra* note 18.

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This ideal is not so much that it enables the system to be more 'intelligent'. However, this intelligence allows more individualized and flexible reactions to the performance of the student.

Moreover, it allows the system to search for underlying causes (misconceptions) of the student's errors or inefficient task performance. It makes it easier to interpret what the student is doing and to offer the student the proper guidance and remedial. It makes it easier to construct a fully individualized and adaptive coaching system. There is no need to anticipate explicitly all the possible behaviors of the student as is the case with an implicit representation.

E. Coaching systems for learning law

The proposed research approach described above, distinguishing between basic, applied and integration research and emphasizing the relation with research from fields such as AI & Law and AI & Education, is followed in the design of legal coaching systems.

HYPATIA aims at designing electronic materials for law students to learn the law. The focus in the HYPATIA research program is on *new additional* materials. These materials are intended to support students where they experience difficulties in acquiring legal knowledge and legal skills and materials are not available. HYPATIA develops *new additional* electronic materials for legal education. Law students experience difficulties in acquiring legal knowledge and in using legal knowledge and law teachers report these difficulties. However, there are no materials available to help students to overcome these difficulties. Therefore these types of materials are developed within HYPATIA. The materials are made available in an electronic environment because of the advantages of individualized instruction and practice combined with immediate support and feedback. A computer program has the capacity to adapt to the individual student's performance, it may support the management of information and it may present various representations and visualisations of legal knowledge and legal tasks. In realizing the electronic materials we take a model based design approach.

Models of legal knowledge and legal reasoning are the basis for designing the materials. To (re) construct these models a variety of theoretical sources are examined. Next to this it is necessary to gain insight in the specific difficulties students experience in acquiring legal knowledge and legal skills.

Remedies are suggested on the basis of both the models of the legal knowledge and skills and the specific difficulties experienced by law students. HYPATIA is divided into specific research programs. For example, instructional environments for acquiring legal concepts, for learning to use statutes on the basis of insight in the system and structure of statutes,

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for learning to use precedents on the basis of insight in the structure and elements of precedents, and for learning to solve legal cases.

We describe three projects within the HYPATIA research program. The first is the design of an instructional environment for learning to solve legal cases: the application PROSA. The second is the design of an instructional environment for learning to structure and analyse case law: the application CASE. The third is the design of an instructional environment for learning to select legally relevant facts out of a real life situation: the application *e*-See.

I. PROSA Problem Situations in Law

PROSA is an Instructional Environment for Learning to Solve Legal Cases with a module in the domain of Administrative law and a module in the domain of Criminal law.[26]

PROSA is an example of a coaching system. It presents an environment in which students can learn to solve cases in law by applying statutory rules.

The task of legal case solving was examined, resulting in a conceptualization of the task and an inventory of difficulties in legal case solving (see Fig. 3).

[26] See Antoinette Muntjewerff, *Evaluating the Instructional Environment for Learning to Solve Legal Cases PROSA, in* COMPUTERS AND ADVANCED TECHNOLOGY IN EDUCATION, 374 (Gustavo A. Santana Torrellas & Vladimir Uskov eds., 2002); Muntjewerff (note 7); Antoinette Muntjewerff & Jolanda Groothuismink, *PROSA A Computer Program as Instructional Environment for Supporting the Learning of Legal Case Solving, in* LEGAL KNOWLEDGE BASED SYSTEMS, 85 (Jaap Hage, Trevor Bench-Capon, Job Cohen & Jaap van den Herik eds., 1998).

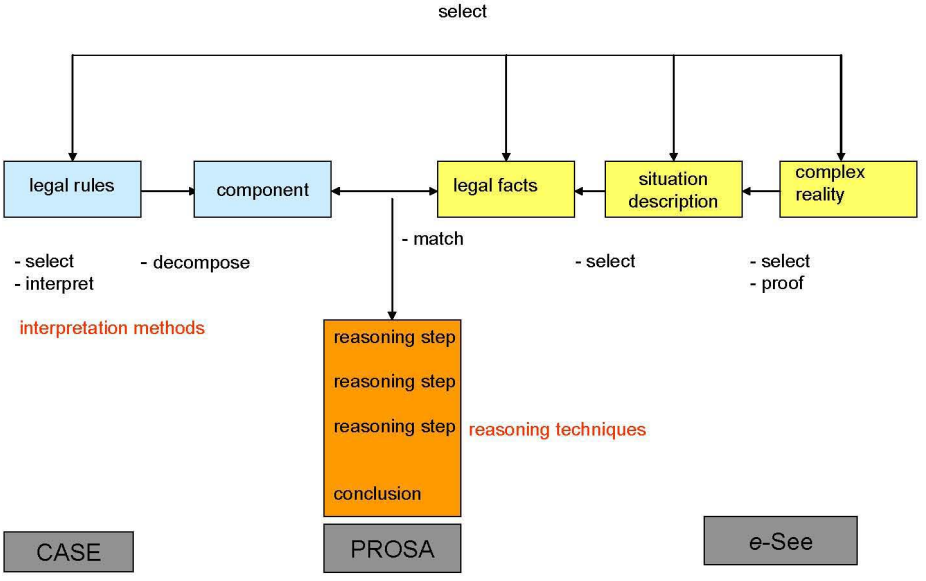

Figure 3: Model of legal case solving

This inventory lead to the conclusion that students should be supported in managing information and prevented from 'jumping to conclusions' to enable the student to construct a correct and complete legal solution. We decided that this requires an environment in which the task components and task characteristics are made explicit in such a way that it restricts the set of activities that have to be performed by the student and it presents systematic guidance to the student.

To select a relevant fact from the situation description requires much leafing that in turn requires the storage of many intermediate findings. As a consequence (short term) memory is exceeded in no time. Making notes may function as a kind of external memory, however, this involves copying articles from statutes and facts from the situation description. This is not only much work, it is also something that students will not do or will not do exhaustively. However, we do want the student to work in a systematic way to prevent them from 'jumping to conclusions' and to enable them to construct a complete and correct solution. We decided to present an environment that meets both requirements: (1) relieve the student of the task of keeping track and recording intermediate results and (2) enable the student to work in a systematic way.

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We want the student to construct a legal solution by herself. By actually having the student work on the construction of a legal solution she may experience what it takes to construct a solution and to "go through the problem" so to speak. We found that the different theoretical sources we consulted present a more or less identical decomposition of the task.

However, we also found that the difficulties in legal case solving are not primarily related to *what* activities have to be carried out, but more to *how* these activities have to be carried out. This revealed that the major role in solving a legal case is reserved for legal knowledge.[27]

The understanding and legal interpretation of a situation description requires a correct mapping between this situation description and the knowledge implied by the domain of practice. Based on our insights in students difficulties with solving legal cases we decided that this mapping should be made explicit in such a concrete fashion that it also should act as an external memory that marks which propositions in the legal case have been covered by the law and which have not been. The latter may mean that the proposition is either not relevant in legal terms or has been overlooked. This leads us to differentiate between the legal case, the legal rules and the legal solution, where we also discussed the different components that make up a solution. We also found out that students have difficulties finding their way in the legal knowledge, therefore we should improve the conceptualization of the legal knowledge. It is therefore important to differentiate types of knowledge based on their role in legal case solving. Because we also think it is important to be able to address the knowledge right from the start we decided to externalize these different types of knowledge.

The instructional model for learning to solve legal cases separates the instructional material and the support material. Because the model only defines the instructional model in abstract and general terms we have to add the specific content and required performance, being the legal knowledge and the legal case solving components. It is very important to present immediate feedback to keep the student from muddling and making serious mistakes. However, we think it is also very important that the student may request feedback whenever she wants. The feedback should inform her about her past, e.g. "how well did I do until this point?", as well as on her future, e.g. "can I go on this way?".

We want the student to engage in legal case solving while the computer program monitors her activities and outcomes and correct her during performance. We committed ourselves to a non model based simulation environment. The environment in the coaching system for legal case solving consists of a simulation of a legal case by using textual descriptions. We do not use an explicit knowledge representation, because for a non model based

[27] MUNTJEWERFF, *supra* note 7.

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simulation this is not required and we do not use the representation for additional functionalities either, for example, we do not keep a student model that keeps track of the student's mastery of individual concepts. We considered some sort of curriculum planning. Curriculum planning involves some sort of sequencing of introducing topics and matching exercises with increasing complexity.

However, we decided to leave it to the student to select a specific topic and difficulty level. The decision was more or less dictated by our view on motivation, where freedom of control by the student is highly valued.

Our main principle in deciding how we have the student navigate in the instructional environment is freedom of choice and control for the student. The student may do what she wants to do and whenever she wants to do it. The instructional environment allows her to look around and to examine each and every detail. There are no time restrictions, the student may take as long as she wants to solve a case, she may even decide not to solve it at all or not completely. However, although the student may do what she wants, there is only one complete and correct legal solution for each case and there are three pre specified routes that are regarded as the best ways to proceed.

So in the feedback the student will be informed about the deviations concerning both the route and the content of the legal solution. She will also receive feedback whenever she carries out an activity or uses some knowledge element that will lead her nowhere. However, it is up to the student to do something with the information or not.

The student can not type in text, text can be manipulated using copy and paste. We will use buttons to enable to student to select a specific activity or certain types of knowledge. A button in turn contains pop up menus each showing a list of specific options to select from. The legal case and the legal rules are presented as text in the specific windows. Because there are space limits it is inevitable, particularly with the legal rules, to scroll text.

The interface of PROSA visualizes the instructional environment we present to the student to learn legal case solving. PROSA does not explicitly instruct a method. However, the design of the screen constraints the ways the solution can be constructed. We argued that it might be more supportive to present an environment in which the basic legal case solving components are externalized. This way the student is not enforced to work in a pre-specified way, however, she does have something to go by that may support her to work in a systematic way. Externalization may also take over cognitive activities from the student that hinders correct task performance. For example, intermediate results no longer have to be administrated internally, the results can be left in a specific window on the screen in this way diminishing the students' memory load. She also does not have to check data and intermediate results "by heart".

The leading principle in designing PROSA is "divide & conquer". We not only made a distinction within legal case solving between legal case solving method and legal knowledge, we also distinguished between types of legal knowledge, which in turn dictate distinctive components in legal case solving. In the instructional model we distinguished between instructional material and support. These distinctions were realized in the interface in such a way that it presents students with an environment that makes it easy to "conquer" legal case solving. This is accomplished by a spatial design of the interface (see Fig. 4). We opted for a fixed composition of the screen. This way the student can easily recognize the legal case solving components, their content and their functionality which in turn may support a systematic approach to solving a case.

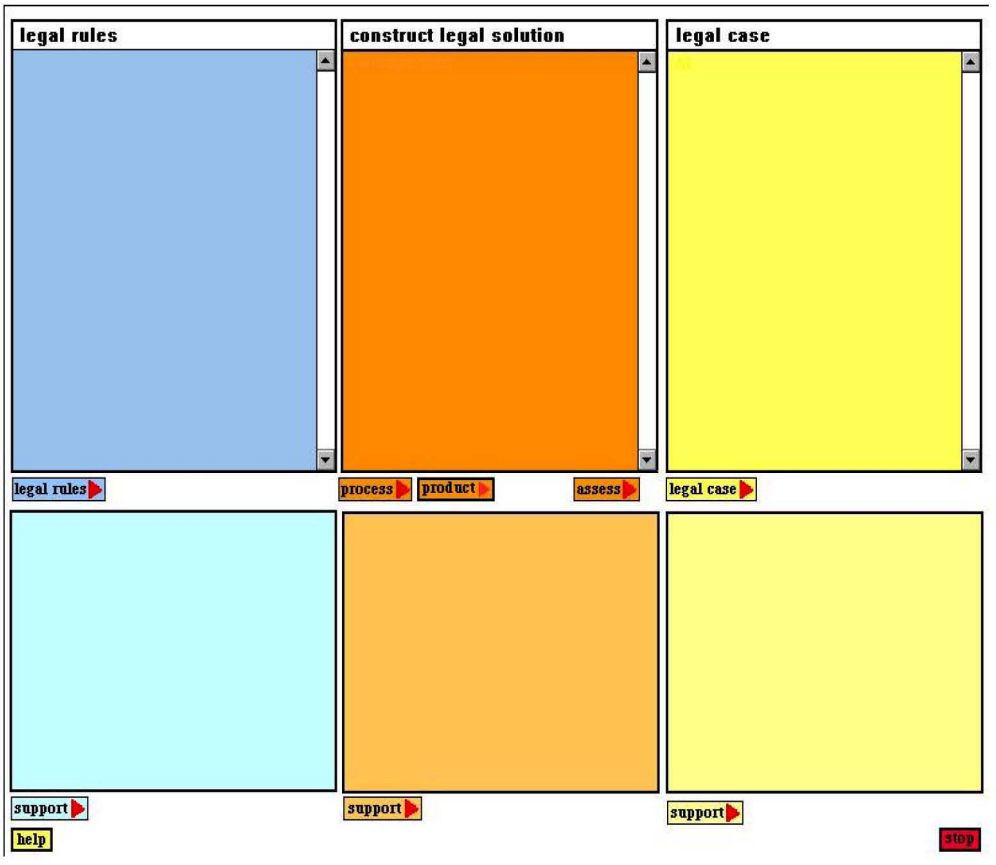

Figure 4: The instructional environment in PROSA.

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The screen is divided into two horizontal layers. In this way a clear distinction is maintained between the presentation of the content and the expected performance on the one hand and the presentation of support on the other. The use of color has functionality in distinguishing the subsequent components that play a role in legal case solving.

The distinction between the presentation of the materials and the presentation of the support is expressed using bright colors for the windows where the materials are presented and using pastel colors for the windows where the support is presented.

The LegalRulesWindow contains the legal rules, i.e. the 'theory' that should be applied to the legal case description in the LegalCaseWindow in the upper layer. The student can select a legal case (legal case button) and legal rules (legal rules button).

The middle window in the upper layer the ConstructLegalSolutionWindow is where the student constructs her legal solution by matching selected article components with selected facts (the process button contains the select and the match options, the product button contain facilities to 'edit' the legal solution). The specific problem posed to the student is put at the top of this window. The students' workspace allows her to keep track of her local decisions. Because there is no prescribed method or order to the way she matches legal rules to facts, the student may work both 'theory' driven or 'case' driven. Therefore, in the end the student is capable to come to a conclusion on the basis of the argument structure. The legal solution is the actual work space of the student. However, we have to deal with the fact that our space on a computer screen is limited. This may result in a rather small work space where it may be difficult for the student to keep an overview. Therefore we introduce an option 'large screen' under control of the student for requesting the larger workspace.

The student may ask feedback (assess button), which in turn is presented in the lower layer in the ConstructLegalSolutionWindow. The student may also ask for elaborations (support buttons) on the legal case, the legal rules or the legal solution to be constructed. This support is then presented in the respective window in the lower layer.

Although maintenance and re-use may be classified as basic requirements, we did not discuss these issues up to this point. This is partially due to the fact that both issues are closely related to design and implementation, partially due the fact that it is more or less incorporated in our handling of the other requirements. Our analyses of legal case solving, the domain of practice and arranging instruction resulted in abstract models that can be re-used as well as maintained. The way the domain of practice is modeled, for example, provides us with guidelines for adding new knowledge, or deleting knowledge that is out of date. The fundamental approach we took in setting up these requirements was continued in the specification and the implementation. We are arranging instruction in a field where the knowledge is liable to minor and major changes due to decisions by the legislator or the administration of justice. To be able to test our claims we had to set limits to both the

amount and types of legal knowledge as to the number and topics of legal cases we could include in the system. All this made us very susceptible to the issues of maintenance and re-use. Here we restrict the description to the way in which we attended these issues in the architecture and the implementation.

Maintaining a system as PROSA, requires that the system can be changed. If the system can be changed it is possible to repair mistakes and to add or delete materials, laws change. It is also necessary that changes can be made without too much costs and effort.
It is important that the cause of a mistake can be detected and corrected easily, that materials that are out of date can be deleted without causing problems elsewhere in the system, and that new materials can be added without causing difficulties in other parts of the system. Transparency of architecture and specific tools may facilitate maintenance.

II. A session with PROSA

To get a basic idea of the functionality of the system we now describe a session with PROSA. The description of the session is based on the recommended route. Starting PROSA brings us to the first screen which shows us the PROSA logo and four buttons.

There is a start PROSA button, an explain PROSA button, an info PROSA button and a stop PROSA button. The start PROSA button brings us to the data request screen where we have to insert our name and student number. This is required so PROSA can keep our individual record. When we indicated that we are ready the PROSA screen appears (see Fig. 4). Imagine we are sitting in front of PROSA.

The first thing we have to do is to select a legal case from the set of available legal cases using the menu button legal case. The legal cases in PROSA are arranged by topic. We decide to select a case with topic *interested party* from the list of topics that pops up. Within each topic the legal cases are arranged by level of difficulty. We decide to select difficulty level *easy* from the list.

The situation description selected is then presented in the upper layer in the legal case window (e.g. the Dapper Market case) (see Fig. 5). At the same time the question that belongs to the situation description is presented in the upper layer in the construct legal solution window (e.g. Is Alexander Boer an interested party according to the General Administrative Law Act?). We now select the menu button process in the upper layer in the construct legal solution window. The list with the two activities select and match pops up.

Being presented with a legal case the next thing to do is to select either a legal rule or a fact from the legal case. So to start constructing the legal solution we have to choose the select option. This results in a change in the construct legal solution screen. The distinction between selecting a legal rule from the set of available legal rules and selecting a fact from the situation description is now visualized. There also appears a specific part in the

construct legal solution window that is titled legal solution. This is where we have to put our intermediate results to construct our legal solution. We select a legal rule by choosing the legal rules button in the upper layer in the legal rules window. This button shows the three different categories of legal rules: statutes, other regulations and case law. Within the statute option a further classification of statutes is made based on the area of law the statutes belong to. We choose the option statutes from the legal rules button and then select the act we think applicable given the specific legal case and question to be answered. This act is presented in the legal rules window (e.g. the General Act of Administrative Law). We now have to select an applicable article from this act. This article has to be copied to the construct legal solution window, in the specific part select legal rule (e.g. Interested party means the person whose interest is directly affected by an order). We may bring the article to the legal solution using the product option bring to solution. We now have to select an article component from the article (e.g. the person) and a fact from the situation description to be matched to the article component (e.g. Alexander Boer). We have to use the match option available in the process button to link the article component to the fact. The match option shows us the available link operators that we can use.

Because we argue that the person is Alexander Boer we opt for the operator '='. Our match is automatically put into the legal solution (e.g. the person = Alexander Boer). We have to repeat the select activity until there are no statutes, articles, article components and facts left. The match activity has to be repeated until there are no more article components or facts.

At that stage we have to formulate the final answer to the question. We choose the option formulate answer in the menu button product and select what we think is the right answer (e.g. A. Boer is not an interested party in the meaning of the GALA). One by one the various elements where put on the screen. At this point we are facing the following screen (see Fig. 5).

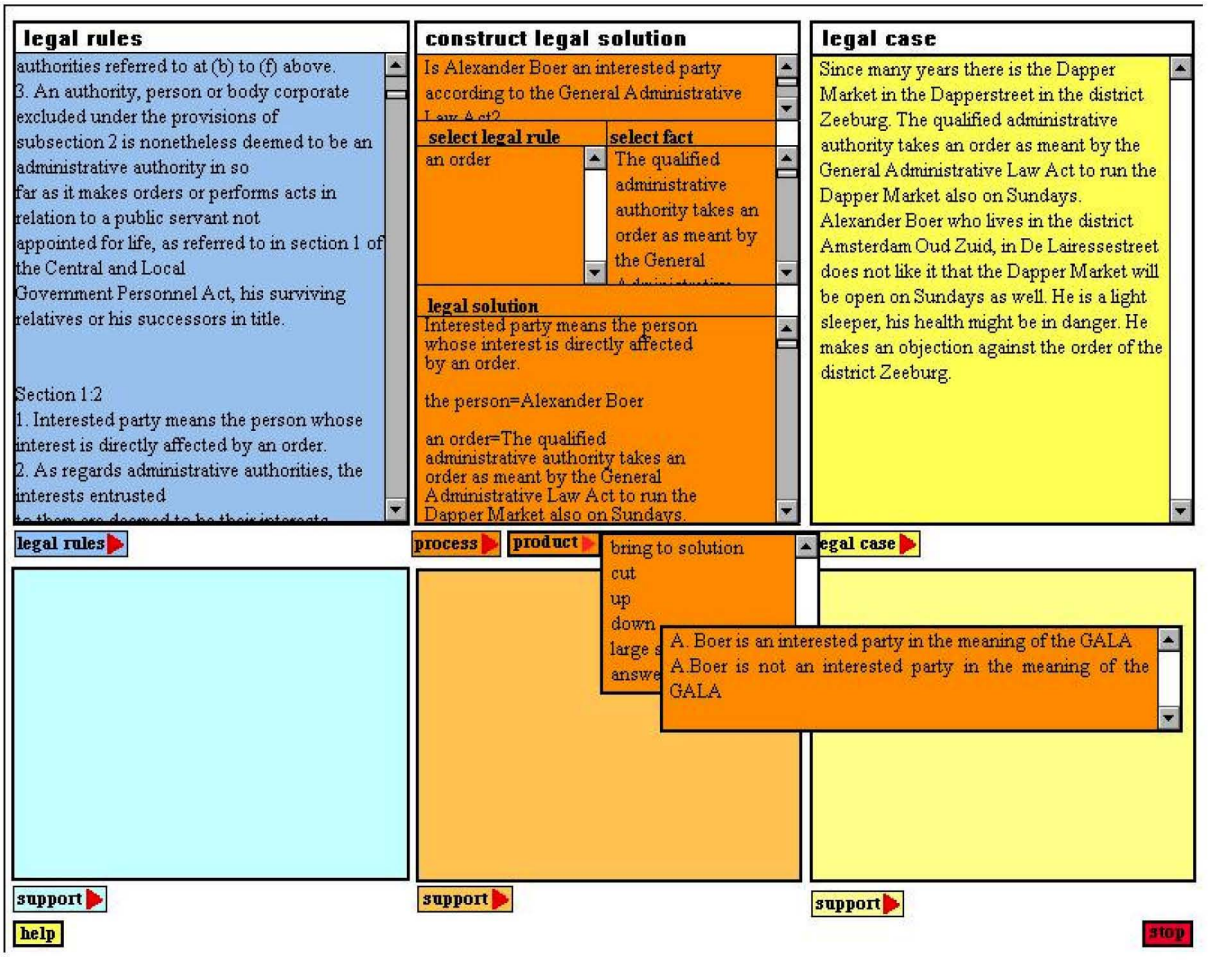

Figure 5: Construct legal solution.

We notice that up till now all materials are presented in the windows of the upper layer. This indicates that we did not request an assessment or an elaboration and that there also was no need for PROSA to correct us.

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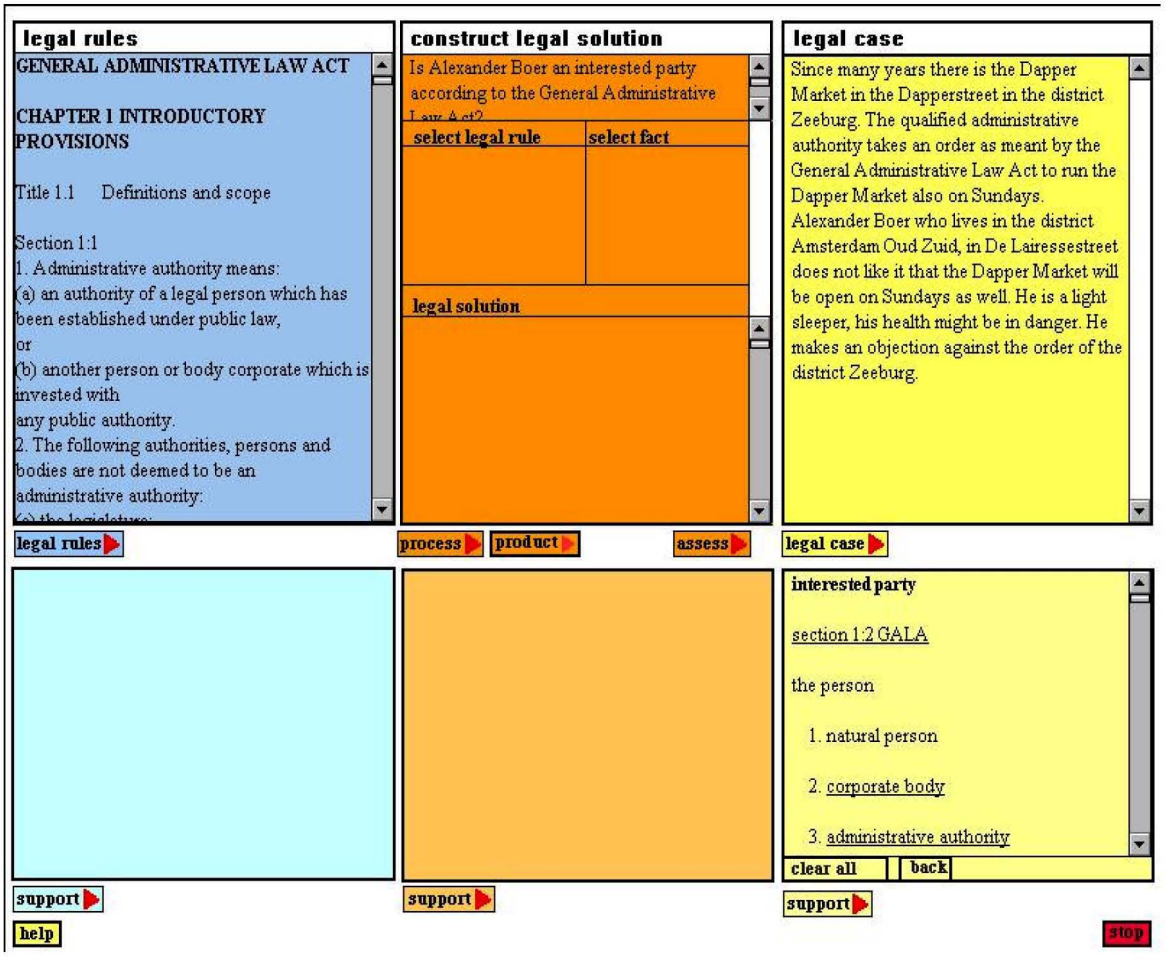

Figure 6: Presentation of the elaboration.

Therefore we now assume that we do not know where to start when we are confronted with the Dapper Market case. We understand that we have to find out if Alexander Boer is an interested party in the meaning of the GALA[28], however, we do not know where we may find the legal knowledge. We therefore decide to ask for an elaboration by using the

[28] GALA = General Administrative Law Act.

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support button of the legal case window in the lower layer. The buttons have different options available as a list of concepts and a topic model. We select the 'list of concepts' option resulting in the presentation of an alphabetical list of terms used in the domain of practice. After selecting the term 'interested party' we get a description of the article components (the legal terms) and a reference to the legal rule. When we click on this reference the legal rule is presented in the lower layer of the legal rules window (see Fig. 6).

We not only may ask for elaborations, we may also ask for an assessment of our (intermediate) results using the assess button in the construct legal solution window. The two types of assessment available are sub assessment and final assessment. When we are sure we want to quit working on the particular case we may ask a final assessment, however, when we want to proceed but also want to have feedback on how we are doing we may ask for a sub assessment. The final assessment will present an overview of what we did right and what we did wrong subdivided to process and product, and within the product specifying the status of the components, component order and answer.

A sub assessment gives us the opportunity to get separate feedback on our route (process) and on our constructed solution (product). We may request an assessment any time we want. Fig. 7 shows a sub assessment of our product.

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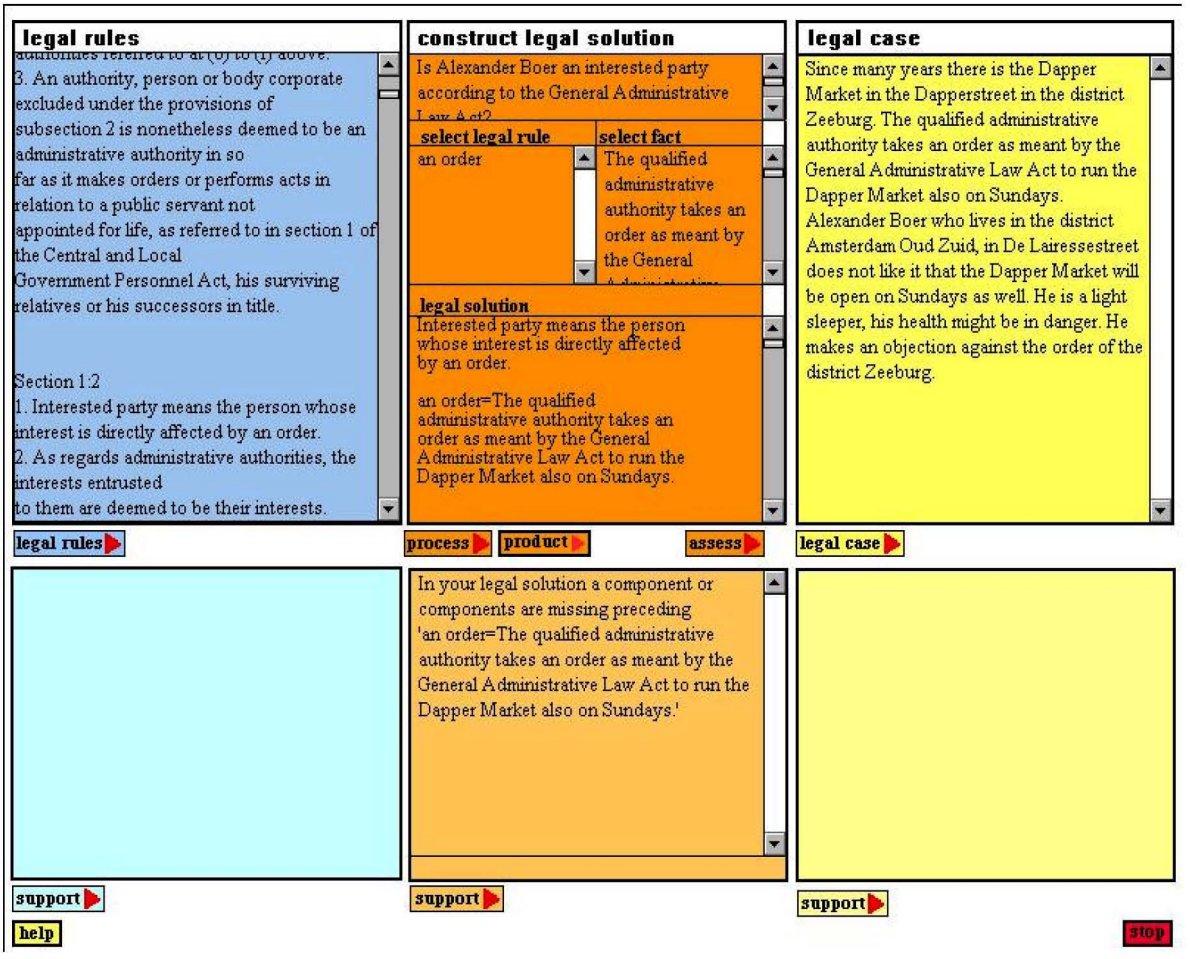

Figure 7: Presentation of the assessment.

When we want to quit working with PROSA we select the stop button which brings us to the stop screen. Here we have different options. We may exit PROSA, we may go back to working with PROSA and we may, before we select one of these options, ask to look at our results. When we choose to look at our results we are presented with our PROSA history.

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This overview shows how many sessions we had with PROSA, how many cases we solved in each session specified to the topic and difficulty level and for the most recent session it specifies for each case our achievements both on product and process.

PROSA is an instructional environment for learning legal case solving. When sitting in front of PROSA in what way is what a student has to do different from the way she is used to solve a legal case (using printed materials and her memory)? It is for certain that in solving a legal case the student is running out of memory quite fast. Therefore students make notes. However, making these notes means lot of work, students have to copy text which is inefficient, and also these notes are often incomplete.

For one PROSA does not put as heavy a load on a students' memory as traditional written legal case solving does. The way of working becomes quite different because PROSA takes over the managing of information by externalizing materials, intermediate steps, and intermediate results in an automatic way. The student can just start working with PROSA and her legal solution evolves on the way.

Secondly PROSA facilitates the acquisition of a systematic approach in solving a legal case by creating a path through the knowledge by differentiating the knowledge on the basis of its function in legal case solving. The legal case is separated from the legal rules and the legal solution is divided into partial components.

Working with PROSA is therefore more efficient. However, is being more efficient also being better? It is, because the most important factor in problem solving is what is expressed as "going through the problem". The more a student actively engages in legal case solving the more she learns to differentiate the knowledge, the more systematic her approach will become and the better a legal case solver she will become.

Facilitating the problem solving process as PROSA does results in knowledge differentiation and a systematic approach in a more efficient way than when solving legal cases in the traditional way.

PROSA presents an environment (not a method) in which:

- the student is facilitated and encouraged to work in a systematic way, the chances to miss or leave out something are nil
- the student does not have to manage her information and she does not have to keep track, the coach takes care of keeping track

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III. CASE Case Analysis and Structuring Environment

Learning law involves reading, structuring and analyzing precedents to be able to indicate the legal meaning of the precedent. Law students experience difficulties with reading and analyzing precedent cases especially with determining the specific legal meaning of a precedent. Within the current curriculum there is not enough time to read and analyze precedent cases in the presence of a teacher who may provide immediate feedback. Law students are also not presented with models that may guide them in the process of reading and analyzing precedent cases. In learning the law it is essential to know how to structure and analyze a precedent. Therefore we suggest a computer program that presents to the law student an instructional environment in which she is able to analyze a precedent in such a way that the structure is made explicit and the legal meaning can be extracted. This can be realized by presenting the student with the text of the precedent (in electronic format) and to present the student a framework for analyzing the text of the precedent. The student can copy and paste parts of the text from the precedent into the framework. This approach also enables comparison of precedents on elements in the framework.

The law that applies in a legal system such as the Dutch legal system consists of general rules that are determined or acknowledged by authoritative bodies. The two most important authoritative bodies within the Dutch legal system are the legislator and the judge. While it is obvious the legislator determines rules that apply in general, this is more complicated with judges. A judge has to decide in individual cases, she has to construct a legal solution based on the facts of the case and the applicable legal rules. In the majority of cases that come before the court, a judge formulates a decision that applies only to the case at hand. These decisions do not add to the body of applicable rules in the legal system. However, in cases where a judge first has to construct an applicable rule, before being able to decide the case on the basis of this rule, we have a different type of decision.

The rule constructed by the judge to decide the case, may add to the body of applicable rules in the legal system. Legal practitioners and legal scientists need to have knowledge of the general rules that apply in the legal system. This involves both knowledge of the legislation and knowledge of the decisions by judges that function as general rules of law[29]. Law students preparing themselves for the legal profession of course also need these kinds of knowledge. They have to acquire knowledge about the role of decisions by judges in the legal system, and they need to understand the two categories of decisions by judges. A

[29] There is profound confusion about the terminology. In Dutch terms as 'beslissing', 'vonnis', 'arrest', 'uitspraak', are used to indicate a decision by an authoritative body. The term 'jurisprudentie' is used to indicate the set of decisions by authoritative instances that add to the body of applicable rules in the legal system. In English the term 'precedent' is used to indicate both the decision by a judge and the role the decision has in the legal system, that is other judges have to take this decision into account in their future decision making, The term 'jurisprudence' has a completely different meaning, where it refers to legal theory.

student has to have knowledge about where to look for decisions of the second category, understand the structure of decisions and learn to determine what makes a decision relevant to the body of applicable rules in the legal system. Legal education primarily aims at acquiring insight in the legal sources, their history and background. This basic knowledge is of great importance; legal problem solving is hardly possible without an understanding of the legal knowledge. To illustrate the use of this knowledge in practice, teachers work through decisions as examples. However, it is difficult, if not impossible, to learn by explanation or by imitation alone. A more effective way to obtain expertise (skill) is by actually performing the task, i.e. students should do the exercises, while the teacher provides feedback on their solutions. Not only feedback on the solution provided by students is important.

For effective learning, also the solution process should be monitored and provided with feedback. Furthermore it is desirable for students to be able to ask for help at any time during the process. They should also be able to practice over and over again. An ideal situation would have a teacher available for every student, monitoring the student while practicing and providing support where and whenever necessary. However, this being not practically feasible, the second best option is to offer the student electronic support. Using a computer program as the instructional medium does have a number of advantages. It may offer individualized instruction and practice combined with immediate support and feedback. It can have the capacity to adapt to the individual student's performance and, last but not least, may support the management of information.

CASE is an environment where a law student can practice with finding decisions, with structuring its text and with analysing the decision in order to be able to determine in what way it adds to the body of applicable rules in the legal system.[30] These functionalities are implemented in two integrated modules in CASE:

1. The Assembler, a module to compile and store decisions

In essence the Assembler is a database containing a selection of decisions used in legal education. The law student can do a search (key word and/or full text) for a specific decision or a set of decisions. Decisions can be added to the database and key words can

[30] *See* Antoinette Muntjewerff, *Constructie en reconstructie van de juridische oplossing, in* ALLES AFWEGENDE, 287 (Eveline Feteris, Harm Kloosterhuis, Jose Plug & Jeanette Pontier eds., 2007); Antoinette Muntjewerff et. al., *Case Analysis and Storage Environment – CASE*, in LEGAL KNOWLEDGE AND INFORMATION SYSTEMS, 1 (Danielle Bourcier ed., 2003).

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be indicated for each decision by the teacher. This module can be used separately or in combination with the PAT module.

2. The Precedent Analysis Tool (PAT), a module to structure and analyse decisions

In essence PAT is an instructional environment for learning to structure and analyse a decision to determine how it adds to the body of applicable rules in the legal system. PAT builds on the Assembler module. It presents the student the text of a selected decision together with a framework containing the main elements in a decision text (as, for instance, the different parties and their roles in the various stages of their procedures before the different courts). It allows the student to fill the framework with the relevant parts from the text of the decision. The activities of the student are monitored, and compared to a model where deviations are diagnosed to be able to present the student with a hint or a remediation.

What is structuring and analyzing a decision? In order to answer this question and to design an environment to support law students in finding, reading, structuring and analyzing decisions to indicate and understand the legal meaning of a decision, it is necessary to analyse the task. The legal sources that were examined to model the task of reading and comprehending decisions all describe a series of steps to be taken by the student when reading a decision to determine the legal significance:

- What are the facts in the decision?
- What is the course of the procedure?
- What is the legal question?
- Which legal rules play a role?
- What are the answers to the legal question of the successive courts?
- Which arguments do they provide?
- What is the complaint in the cassation plea regarding the decisions in the preceding courts?
- Which arguments are provided in the cassation plea?
- What is the opinion of the Solicitor General on the legal question?
- What arguments does the Solicitor General see as decisive?
- What is the opinion of the Supreme Court regarding the legal question?
- Which arguments does the Supreme Court use in this?
- What is the final outcome of the decision of the Supreme Court in this decision?

However, merely *instructing* a method does not work for novices (see for details Muntjewerff, 2000). This is partly due to the fact that instructing a method is a problem in itself, as it is difficult to communicate a method, because this requires the translation of

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actions into words. A method is in fact empty; explaining content is much more "substantial" and therefore easier. The somewhat paradoxical situation is that novices have to learn to determine the legal meaning by determining the legal meaning. Law students especially have difficulties with determining what the decision adds to the body of applicable rules in the legal system. Based on findings in research in legal problem solving it is stated that the difficulties are first of all caused by insufficient mastery of, or insight in, the subject matter. Secondly, especially for novices, methods, often as a side effect, emerge from (novice) problem solving, instead of being the driving force. The subject matter appears to be the major source for finding or trying (a) solution (steps). On closer inspection, a decision is a legal solution for a specific problem situation constructed on the basis of abstract legal rules.

Structuring and analysing a decision is in fact the task of reconstructing the problem situation (consisting of a reconstruction of both the facts and the legal question), tracing the abstract legal rules that were applied and specifying the legal solution consisting of the argument structure and the conclusion[31].

Reading and understanding a decision is not a trivial activity. Observations with first year law students reading decisions showed that they experience difficulties with seeing through the composition of the decision, with reconstructing the argument structure and with determining the legal significance of the decision.

These difficulties are first of all caused by the fact that a decision is an incomplete reproduction of what happened. Next to that the text of the decision contains many references, both explicit and implicit, to regulations, other decisions and concepts. The fact that a decision has a stratified structure which is also not supported by recognizable clues or elements in the text does not help either.

All of this means that the student has to reconstruct the process and the product which involves keeping track of intermediate results. To support the student in performing these tasks, the following remedies are proposed. Present the student a structure to help her to reconstruct the decision, support the management of information and engage the student in structuring and analysing the decision by having her actually carry out these tasks.

This is realised by presenting the student with both the full text of the decision and a framework which visualises the elements in a decision necessary to reconstruct the decision in order to determine the legal significance of the decision (see Fig. 8).

[31] In PROSA the main goal is the construction of a legal solution. The problem solving goal is the question. On the basis of the specific facts and the abstract legal rules the argument structure is constructed to result in an answer to the question. Structuring and analysing a decision is *re*constructing a legal solution. On the basis of the conclusion the argument structure that lead to the conclusion has to be reconstructed to be able to pose the legal question.

Figure 8: Framework

structuring the decision

name
court place date source (publication source, year, number)
area of law private law
public law criminal law
administrative law
constitutional law
international law

parties

instance	initiator	opponent
first instance		
appeal		
cassation		

facts

instance	indisputable facts	disputable facts
first instance		
appeal		
cassation		n.a.

claim

instance	claim/request
first instance	
appeal	
cassation	

question

instance	factual	qualification	legal
first instance			
appeal			
cassation	n.a.		

legal ground

instance	legislation	decisions
first instance		
appeal		
cassation		

dictum

instance	dictum
first instance	
appeal	
cassation	

reconstructing the legal solution

legal rules	reconstruct legal solution	facts
	conclusion argument structure legal question	

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There are no applications available that support law students in structuring and analysing a decision suiting the Continental legal system. For the Anglo-American legal system, the CATO application is available.[32] In CATO the student is trained to construct arguments with cases.

The aim of the CASE project is to realize an environment in which law students are supported in structuring and analyzing a decision. This means that both the decision at hand has to be presented to the student, as well as the framework for analysis. The student must be able to select text fragments from the decision and paste these within the correct cell in the relevant table in the framework. Since finding cases is also part of the training of law students search facilities have to be available in the environment. The functionality of searching for a decision is implemented in the module called 'Assembler'. The functionality of structuring and analysing a decision is implemented in the module called 'PAT'. Other basic requirements are maintenance and re-use. It should be possible to make changes to the system and its content without much costs and efforts. Errors in system and content should be easily traceable and correctable. It must be possible to add and delete content without causing problems elsewhere in the system. Transparency of the architecture and tools are therefore design goals, as it may facilitate maintenance. The system has functions for adding decisions, adding key words to decisions and preparing decisions for use in PAT. System functionalities are attributed to a user on the basis of her status: administrator, editor, teacher or student. The CASE architecture is depicted in Fig.9. The Assembler module holds the decisions and allows for search and retrieval of cases and allows teachers to prepare cases for use in the PAT module. Students can use the Assembler to locate cases on the basis of key words and/or full text search to find specific decisions. When the student wants to structure and analyse a decision she can select one of the reported decisions. This decision and the analysing framework are then made available to the student in PAT. The student can start structuring the decision by selecting text fragments in the decision and pasting these in the correct part of the frame.

[32] ALEVEN, *supra* note 7.

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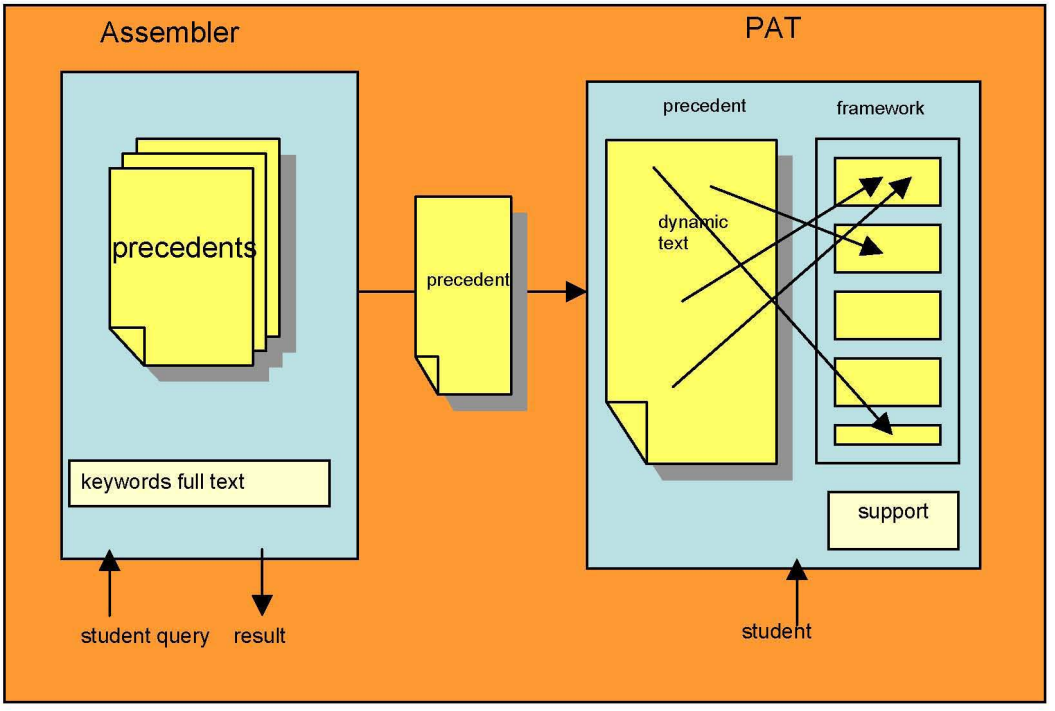

Figure 9: CASE architecture.

CASE is implemented using a web-based server-side application model. The user interacts with the system using a standard web browser, such as Netscape Navigator, Apple Safari or MS Internet Explorer. CASE is developed using Open Source Software, MySQL (4.0.14) and PHP (4.3.2) and JavaScript. The MySQL database backend contains a number of tables, the most prominent ones being a text fragment table, a solution table and a table storing the student's activities. Case's primary component is the server-side application implemented in PHP (4.3.2). This application handles form processing, storage and retrieval of information from the various tables in the database and generating the HTML pages that are output to the user. A small number of simple functions are implemented using client-side JavaScripts. CASE offers extensive support for administrative-, editing-, browsing-, tracking- and educational tasks. Using the same portal, administrators can add, remove

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and change users and cases; editors can add keywords to cases and prepare the solution framework of a case for use in PAT; teachers can use the interface to track the results of students, previewing the solution framework and for browsing and searching the database; and students can browse and search the database, and test their analysis skills using PAT.

The search engine allows for both Boolean keyword- and free text search in combination with metadata fields such as: date, name, court etc. The principal concept in CASE is that a precedent can be seen as an ordered set of text fragments, each of which can be labelled according to their place in the solution template. The student can select a text fragment and place in a specific position within the solution framework. Text fragments can be as short as a single sentence, but more often, they are as long as a paragraph. The text fragments are stored in a database along with metadata such as a reference to their position in the solution. Although a text fragment as described is the basic building block, these fragments can have one or more sub-fragments (such as single words) which can also be selected by the student. For instance, the text fragment

> *"Op het beroep van Ronald G, geboren te Amsterdam op 6 aug. 1954, wonende te Amsterdam, req. van cassatie tegen een bij verstek gewezen arrest van het Hof te Amsterdam van 12 dec. 1977, waarbij in hoger beroep een vonnis van de Rb.",*

contains the sub-fragment 'Ronald G', the accused. In some cases the student needs to select the whole sentence, and in others only the sub fragment. The solution framework consists of a number of tables, such as parties, facts, claim and the argument structure before the Supreme Court (see Fig. 8). Each table is two dimensional and contains a small number of cells, e.g. facts as presented by the initiator, and facts presented by the opponent. Each cell in the solution, therefore, can be designated by three coordinates: table, row and column. These coordinates are used to mark the proper location of text fragments within the solution framework. They allow the student's solution to be tested against the solution defined by the teacher; the cell in which the student places the fragment has to match the metadata reference of the text fragment. In the case of an incorrect placement of a fragment, its position relative to the correct place is also known. This allows for standardised responses to common errors. For instance, when a student puts the initiator's name in the opponent's cell, the following response can be generated on the basis of this mixing up of the parties in the dispute: "This indeed is one of the parties in the dispute, but unfortunately it is not the opponent.". To get a basic idea of the functionality of the system we now describe a session with CASE.

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3. A session with CASE

As mentioned above, CASE distinguishes four types of user: *administrators, editors, teachers* and *students*. User rights are distributed in an *incremental* fashion in CASE, this means that a teacher has access to both student- and teaching facilities; an editor has access to editing-, teaching- and student facilities; and the administrator user has rights to do everything the other users can, plus adding, removing and changing users, and removing cases from the database. This section describes a typical process from preparation to analysis of a case.

4. The Editor

After login, the editor is presented with a menu containing multiple options: *editor's menu, teacher's menu, Assembler, PAT, change password* and *logout*. Since she recently came upon a decision relevant for law students, she decides to add it to the CASE database. The *editor's menu* gives access to the *add decision* screen. Here she fills in a few facts about the decision (name, publication date, court etc.) and with copy- paste actions, she adds the text of the decision to the database. Next, she visits the *metadata editor* (see Fig. 10).

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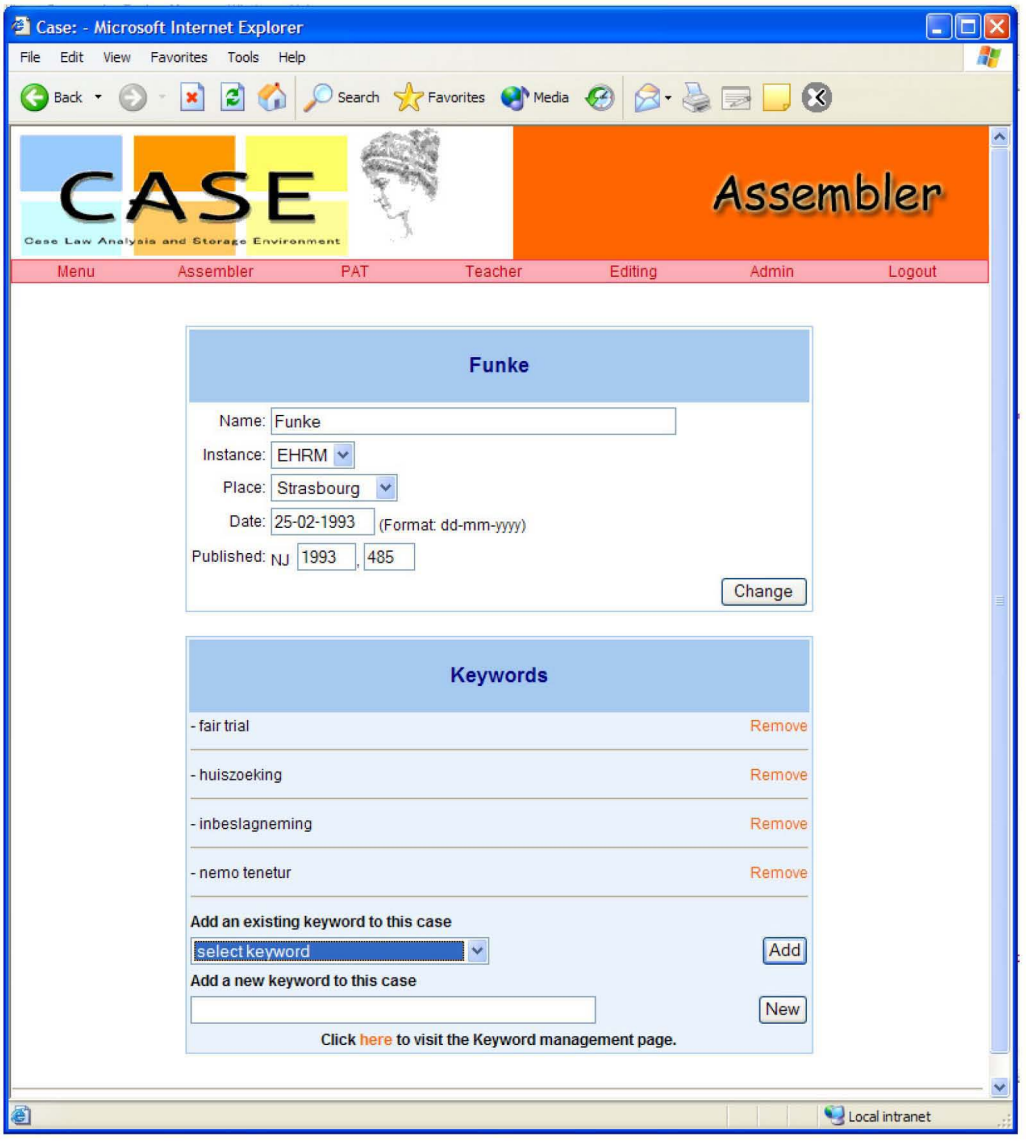

Figure 10: Metadata editor

The metadata editor interface is used to add or change metadata of a decision and, more importantly, to add new keywords, or remove existing ones. After completing this procedure, the decision can be searched for using the search interface.

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The next step is the preparation of the decision for use in PAT. The PAT Prepare tool offers an interface that mimics the regular PAT interface: the editor needs to place pieces of text in the correct position within the solution framework (see Fig. 11).

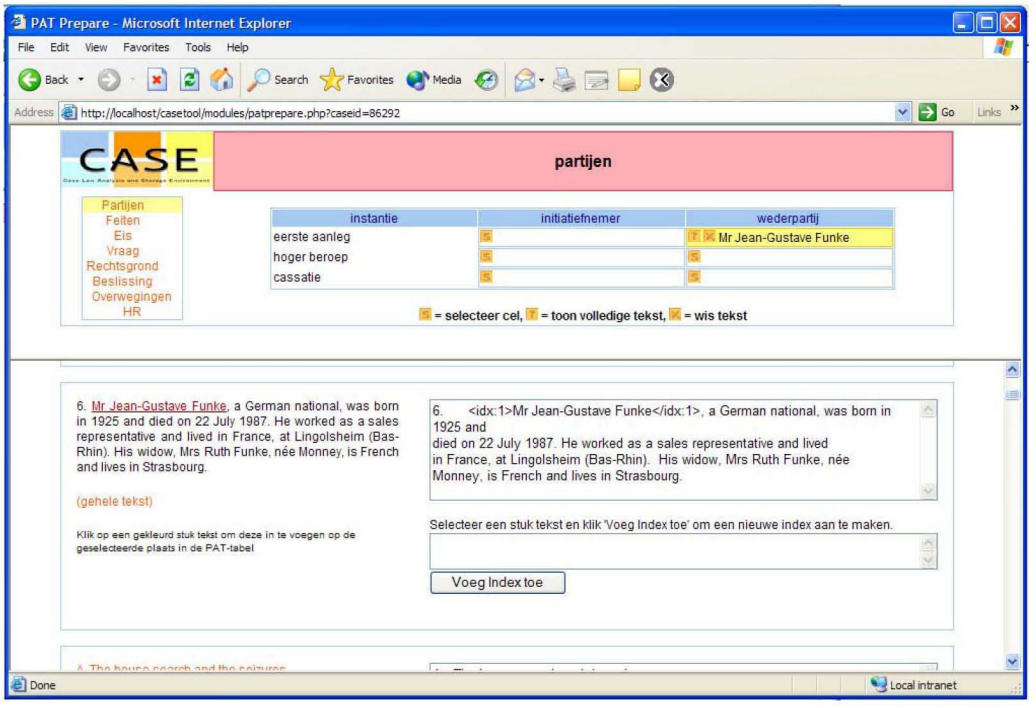

Figure 11: PAT prepare tool

Where the regular PAT interface checks whether the correct text is in the correct position by consulting the database, the PAT prepare tool writes the action of the editor to the database. The editor in a sense teaches PAT the solution of the case at hand. Note that the editor does not have to add feedback to the database. Feedback is provided to the student in a case-independent way. When the teacher only wants part of the text fragment to be part of the solution, the editor can simply mark these smaller parts. This results in a text fragment with color coded sub fragments that can be placed in the solution table (e.g. Mr Jean-Gustave Funke in Fig. 11). After the editor has finished the above steps, the decision is ready for use by both teachers and students.

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5. The Teacher

The teacher is not allowed to change the information or the solution framework of a decision. However, he can add students to the CASE user database, and preview the correct PAT answers (the prepared solution framework) for each decision. More importantly, the teacher has access to a student tracking facility to analyze student behavior.

This way the teacher can determine whether a student came to his or her end-result by simply trying every option, or by purposefully placing fragments in the solution framework.

6. The Student

Students can search the decision database using the Assembler search interface (see Fig. 12). This interface allows for metadata search – i.e. on publication date, publication place, court type, court location – but also supports Boolean keyword search and Boolean full text search. The student can also browse through all decisions in the database. The search result page offers support for associative search because key words and other attributes of the cases found are shown. The student can click on any of these to start a search on this attribute.

Thus, for example, searching on all decisions with the same keyword of one of the decisions that were found by the original search is done by simply clicking on that keyword in the results page. From the same page, the student can print a decision or open it in PAT.

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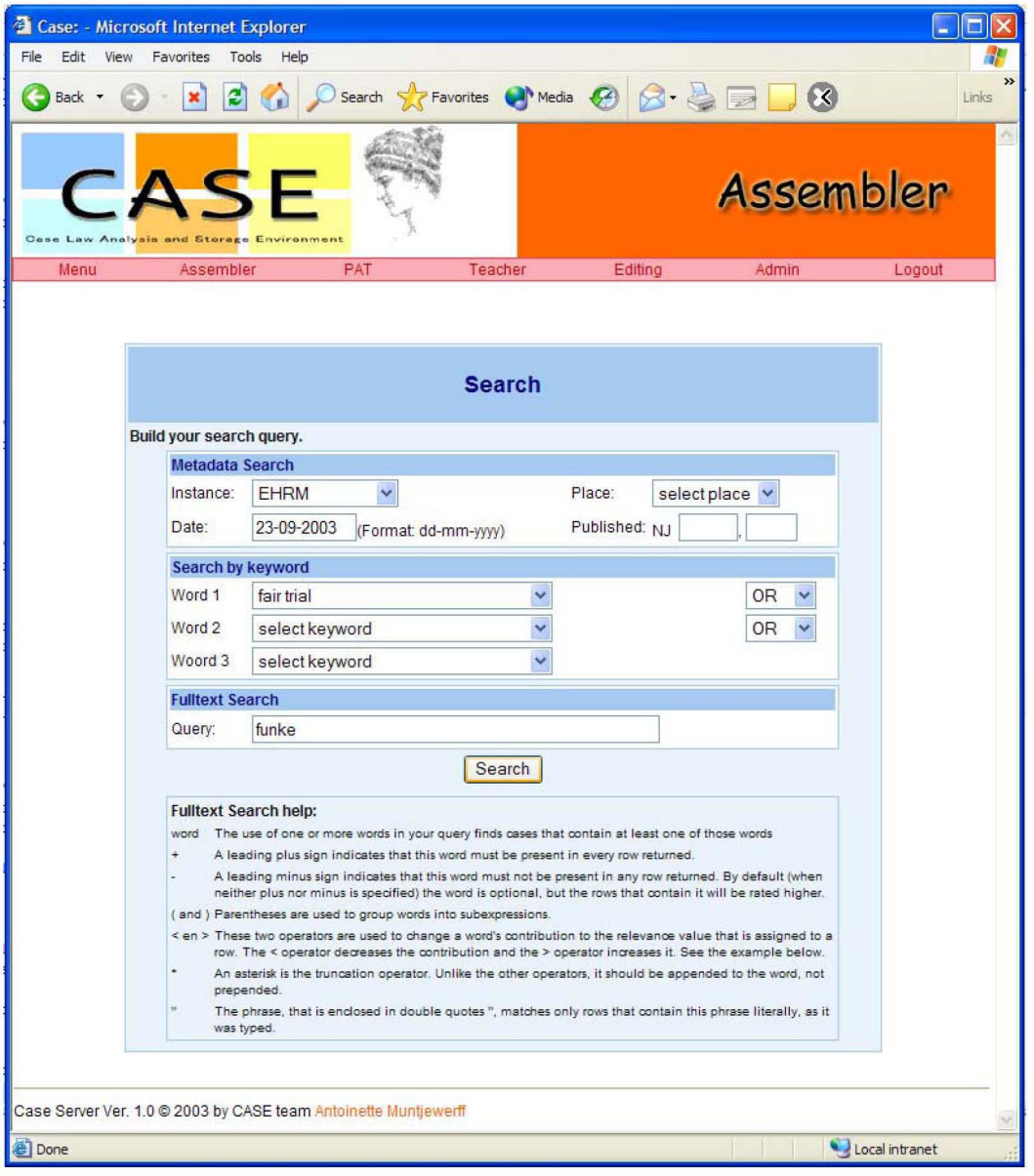

Figure 12: Search the database

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The PAT interface, shown in Fig. 13, is divided into three frames. The left frame shows all text fragments of the decision at hand. The top right frame contains the tables of the solution framework. The bottom right frame provides feedback to the student's actions. A text fragment is placed in a cell of the solution table by first selecting the cell, and then selecting the fragment to fill this cell. Once placed, the application will check the combination of cell and fragment and provide a feedback message from the database in the feedback frame. Text fragments can be removed from a cell by clicking the 'x'-button in the table. Once the student has placed all correct fragments in a specific table, she is notified of this through the feedback frame.

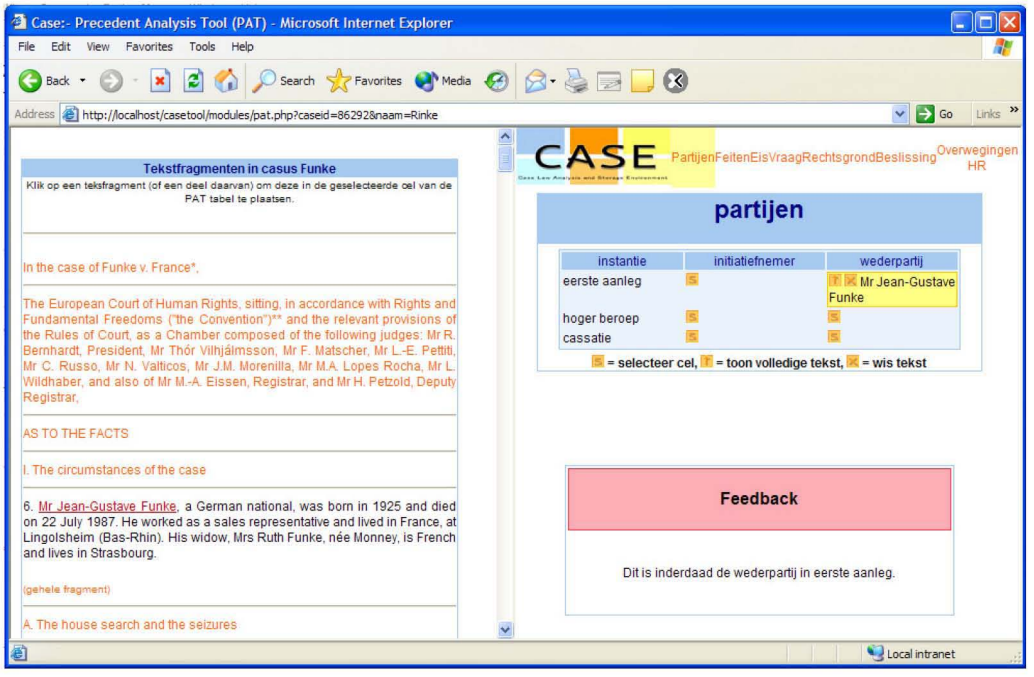

Figure13: Structuring and analysing a decision

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III. e-See Embedded Streaming Video for Legal Problem Solving

e-See is an instructional environment for training the construction of a case description involving the selection and ascertaining of facts from a real life dispute

The legal task at stake here is legal case solving, the key activity in legal practice and legal research. Legal case solving involves the construction of a legal solution for a specific case description using abstract legal rules as the problem solving devices. An extensive analysis of the task of legal case solving can be found in Muntjewerff (2000).[33] The basic activities involved in constructing a legal solution are: construct a case description from real life by selecting facts from the real life situation and where necessary ascertain these facts and select applicable legal rules, decompose the legal rule into components, select a component and select a specific legal fact from the case description to match the component to the legal fact. The emphasis in legal education is on the application of legal rules to a case description that is presumed to be complete. To construct a legal solution the student has to select the applicable legal rules and to apply these rules to facts in the case description. PROSA is developed to support law students with learning to select the applicable legal rule, decompose the legal rule into components that can be matched onto selected legal facts from a case description. However, no attention is paid to the construction of the case description. Fernhout et al. (1987) claim that in legal practice most of the time and effort is spent on the activities of selecting facts and ascertaining facts to establish the case description.[34] Fernhout et al. (1987) constructed the coaching system OBLIGATIO which mimics real life problem solving dialogues with clients. Although this application filled a gap, it is limited in its use and technically out of date. Therefore *e*-See is designed to present law students with an environment where they are enabled to construct a case description. The students are presented a real life situation. They are asked to construct the case by selecting and ascertaining the facts that they think are relevant. Where facts can only be assessed as relevant given applicable rules, students have to select applicable rules as well. Constructing a legal solution always involves an interaction between the facts and the legal rules. Depending on what facts you select certain legal rules may become applicable, where based on the selection of legal rules certain facts may become relevant. It is exactly this interaction that makes legal problem solving such a complex activity. Besides that a major problem with selecting and ascertaining facts in legal problem solving is that it may be necessary to actually observe facts in the real life situation.

First of all it must be stated again that the activity of constructing a case description on the basis of a real life situation is not part of the legal curriculum where in legal practice this is the main activity in legal problem solving. When involved in the activity of constructing a

[33] MUNTJEWERFF, *supra* note 7.

[34] FERNHOUT ET. AL., *supra* note 7.

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case description the main difficulty is that depending on what facts you select certain legal rules may become applicable, where based on the selection of legal rules certain facts may become relevant. This interaction between possible relevant facts and possible applicable rules is one of the main difficulties in legal problem solving. The only way to really get to grip with this is to practice legal problem solving over and over again. Next to that to be able to recognize a typical legal problem situation in the real life events involves the availability of legal knowledge. Students need to know the system of legal rules and the basic legal concepts and their position in law.

The student has to leaf through the legal rules and has to go back and forth from legal rules to the real life situation. In this process keeping track of intermediate results is also a major difficulty. Another difficulty in constructing the case description is that it may be necessary to actually observe facts in the real life situation, often written documents stating facts and events are not enough.

The remedies proposed to support students in constructing a case description is to present an environment in which the components and characteristics of the activities are made explicit in such a way that it restricts the set of activities that have to be performed by the student and presents systematic guidance to the student. Such an environment relieves the student of the task of keeping track and recording intermediate results and enables the student to work in a systematic way. We want the student to construct the case description herself. By actually having the student work on the construction she may experience what it takes to construct a case description and to "go through the problem" so to speak. *e*-See presents an environment in which the student is facilitated and encouraged to work in a systematic way, the chances to miss or leave out something are nil, the student does not have to manage her information and she does not have to keep track, the coach takes care of keeping track. Real life is imported by integrating video in the instructional environment for training the construction of a case description from a real life dispute.

In *e*-See we use video materials of a real life dispute in a real life situation. Video materials from the Dutch television program De Rijdende Rechter (the Mobile Judge) are made available for educational purposes within the project Davideon.

Legal problem solving requires the availability of legal knowledge. This knowledge can be found in the legal sources. Dutch law is part of the family of Continental law where the main legal sources are, in order of significance, convention, statute, precedent and common law. Legal sources are grouped into areas of law. The basic areas of law are public and private law. Within these areas different fields are distinguished, for example, within public law we distinguish constitutional law, administrative law and penal law, where in private law we distinguish family law, law of legal persons and property law. Within *e*-See these legal sources are available to the student in a variety of representations. There is also

a list of basic concepts available to the student. These concepts in turn link to legal sources.[35]

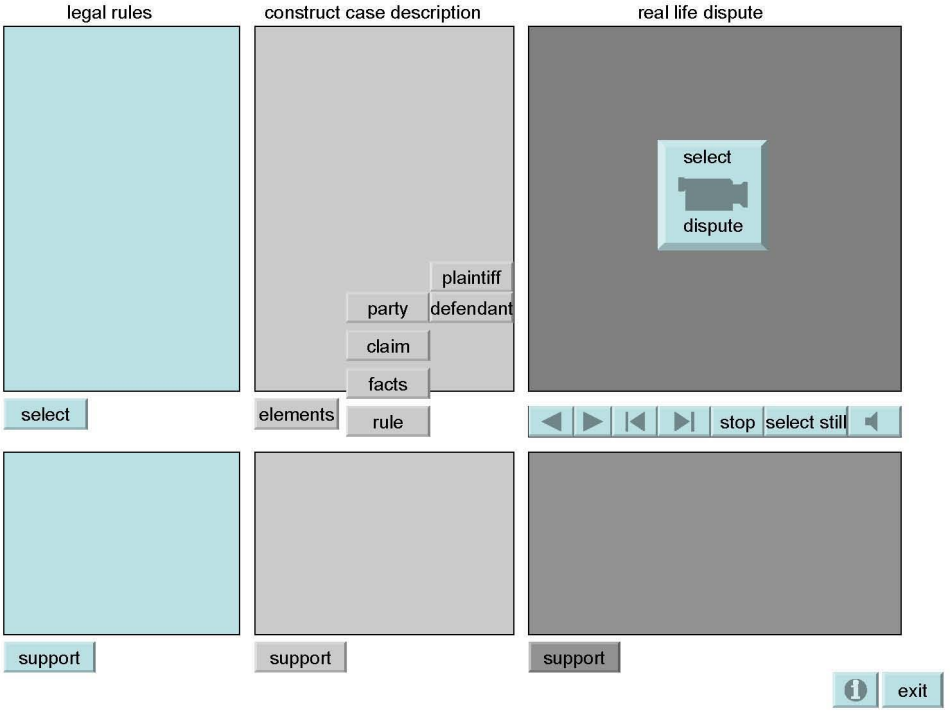

Figure 14: e-See architecture

e-See has to coach the student to enable her to construct a case description. The *e*-See environment is implemented using a web-based server-side application model. The user interacts with the system using a standard web browser, such as Netscape Navigator, Apple Safari or MS Internet Explorer. The application will be developed using HTML and

[35] *See* Antoinette Muntjewerff, *e-See An Instructional Environment for Learning to Construct a Case Description, in* INTERNATIONAL SCIENTIFIC JOURNAL OF METHODS AND MODELS OF COMPLEXITY 3 (2007); Antoinette Muntjewerff & Dorien DeTombe, *A Generic Environment for Integrating Streaming Video in Legal Education e-See, in* EDUCATIONAL MULTIMEDIA, HYPERMEDIA & TELECOMMUNICATIONS, 527 (Gary Marks ed., 2004).

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JavaScript. For the video editing Avid Xpress DV is used. The application is realized as a generic environment in such a way that it can be re-used for other legal domains where students have to select and ascertain facts in constructing a case description. Therefore it is required that the domain knowledge can be extended and video fragments can be uploaded easily. Maintaining a system as *e*-See requires that the system can be changed. If the system can be changed it is possible to repair mistakes and to add or delete materials. It is also necessary that changes can be made without too much costs and effort. Therefore editors are added to facilitate maintenance and re-use.

1. A session with e-See

To get a basic idea of the functionality of the system we describe a session with *e*-See. The student selects a real life dispute in the real life dispute part of the screen (Fig. 15).

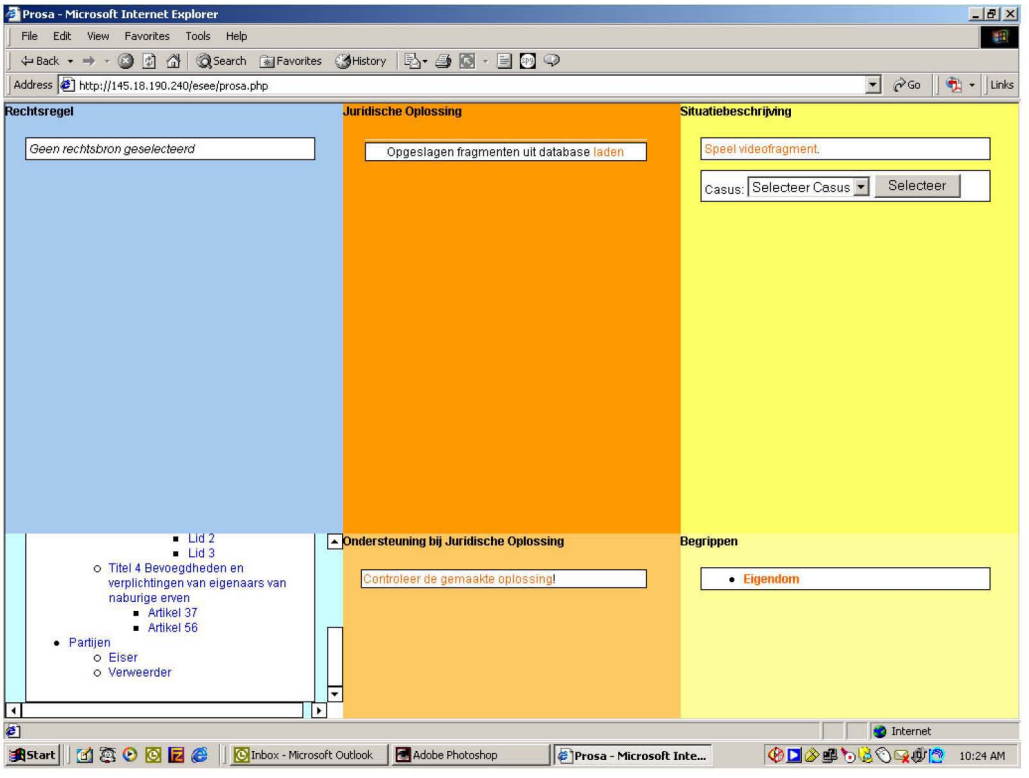

Figure 15: Select a real life dispute

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This dispute is presented by the student showing a video of the real life situation in which parties are having a dispute about some issue. The video player is equipped with the usual control buttons and with an extra *select still* button (Fig 16).

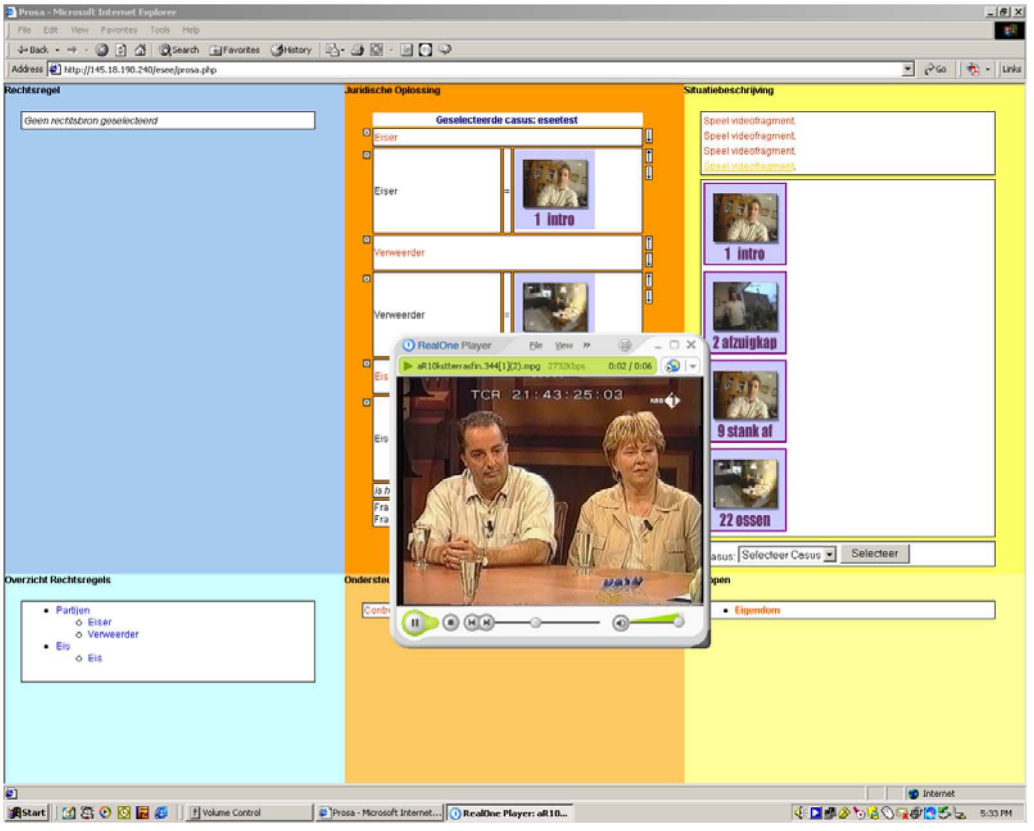

Figure 16

In the construct case description part of the screen the student is presented a menu showing the elements to select from the real life situation to construct the case description (i.e. party, claim, facts, and rule). The student has to select an element, for instance *party*, and find out who the actual plaintiff is in this real life situation. She then selects the *still* matching the plaintiff from the real life part of the screen and brings the still to the case construction part of the screen. Where the video is fragmented in stills and supplied with matching text fragments the text fragment is presented in the case construction part of the

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screen when pasting the selected video fragment. To be able to select the correct fragments the student has to select (a) legal rule(s) using the select button in the legal rules part of the screen.

F. Summary and Conclusions

Reforming legal higher education involves organisational aspects as well as aspects on learning and instruction. We focus on the learning and instruction part of education and also make a restriction for institutionalized learning and instruction, that is, learning and instruction that takes place within the context of a school or university. Instruction should aim at enhancing effective and efficient learning, that is the acquisition of knowledge and skills in the field or subject area at stake. Instruction involves presentation of learning materials and presentation of support in processing these materials. Technology can be used in instruction to support both the presentation and the processing of learning materials. The HYPATIA research program describes a methodology for principled and structured design of electronic materials for learning the law effectively and efficiently.

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