An Instructional Environment for Learning to Construct a Legal Case Description

e-See

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Abstract: Law students experience difficulties in acquiring legal knowledge and in applying legal knowledge when performing a legal task. To support law students in acquiring legal knowledge and legal problem solving skills we develop *e*-materials for learning the law. In this paper we first describe the general design methodology used in realizing these *e*-materials: HYPATIA. This is followed by describing the design of the training tool *e*-See, an instructional environment for learning the construction of the legal case description. The construction of a legal case description from real life facts and events is an essential part of legal case solving. Constructing a legal case description involves the selection and the proof of facts and events from real life. There are two major problems with selecting and proving facts from real life.

First there is the problem of the complexity of real life where only certain facts are legally relevant. The second problem is that it may be necessary to actually observe facts in real life. For both problems we argue that integrating video in the instructional environment is of help to the student in acquiring the skill of constructing a legal case description.

1. Introduction

HYPATIA is the name of the methodology for designing *e*-materials[1] for learning the law as developed by Muntjewerff (2000). The methodology aims at designing and realizing *new additional* electronic materials for law students to learn the law (Muntjewerff, 2002b, Muntjewerff 2002c). Law students experience difficulties in acquiring legal knowledge and in applying this knowledge in performing a legal task. These problems are acknowledged by law teachers. However, there is no material available to help students to overcome these difficulties. HYPATIA aims to fill this gap. Within HYPATHIA *e*-materials are developed to present individualized instruction and practice, following a principled and structured design approach involving three interrelated streams: basic research, applied research and integration research (see Table 1).

HYPATIA methodology		
1. basic research	model construction	theoretical research empirical research
2. applied research	*e*-materials construction	
3. integration research	classification selection	

Table 1: Three steps in the HYPATIA methodology for designing e-materials for learning the law

[1] With *e*-materials for learning the law we refer to electronic materials that support communication, information gathering, knowledge acquisition, t problem solving skill acquisition and assessment.

Basic research is concerned with (re)constructing well-founded models of legal knowledge and legal problem solving tasks. In the basic research part these models are used to examine the ways in which both experts and novices (students) acquire legal knowledge and apply legal knowledge when solving legal problems.

In the applied research part the outcome of the basic research is used to actually design and realize *e*-materials. Depending on the content and aim of the *e*-material to be designed, specific models of legal knowledge and legal problem solving tasks, (re)constructed in the basic research part, are selected as the content for the application. The research findings on how experts and novices solve legal problems provide insight in difficulties. On the basis of these findings remedies are proposed. Next to decisions about the content of the *e*-material to be designed the applied research part also sees to making decisions on how the content is presented to the student to be able to learn effectively and efficiently. Therefore an instructional model has to be selected or constructed. The instructional model should be constructed on the basis of a global theory on learning and instruction to guarantee that the design process will result in a coherent and consistent instructional model. Finally, the applied research part is concerned with the evaluation of the *e*-materials through both developmental testing and field testing.

The HYPATIA methodology is used to design different types of *e*-materials for educational purposes. These *e*-materials cover a wide range of legal knowledge and legal problem solving skills to be acquired by the law student to become a skilled legal practitioner and/or legal scientist. Therefore a law student or a law teacher must be able to select the proper *e*-material for learning or teaching certain legal knowledge or a specific legal problem solving skill. This requires criteria for storing and selecting *e*-materials.

In the integration research part of the HYPATIA methodology the main concern is to construct a classification of *e*-materials for learning the law and criteria for selecting the proper *e*-materials.

The HYPATIA methodology is used successfully in the construction of an instructional environment for learning to construct a legal solution: PROSA (Muntjewerff & Groothuismink 1999; Muntjewerff 2000, Muntjewerff 2002a) and in the construction of an instructional environment for learning to select and analyse legal precedents: CASE (Muntjewerff, Jordaans, Hoekstra & Leenes 2003). In this paper we apply the methodology to the design of an instructional environment for learning to construct a legal case description: *e*-See.

2. Model construction

The aim of the basic research in the HYPATIA methodology is to (re)construct explicit models of legal knowledge and legal problem solving tasks to be applied in *e*-materials for learning the law. These models are (re)constructed on the basis of theoretical and empirical research findings.
In the theoretical research we explore, specify and conceptualize legal knowledge and legal problem solving tasks from sources as legal empirical research, legal educational practice, legal theoretical research and Artificial Intelligence & Law research.
In the empirical research we carry out studies to acquire insight in the way legal practitioners and legal scientists handle legal knowledge and use legal knowledge given a specific legal task and we carry out studies to acquire insight in the way law students handle legal knowledge and apply this knowledge when performing a legal problem solving task. The outcomes give indications about acquiring legal expertise in general and about specific difficulties in acquiring and using legal knowledge in a specific legal problem solving task.

2.1 Theoretical research for model construction

Within the theoretical research part in model construction two perspectives are taken: a legal perspective and a knowledge engineering perspective.
From the legal perspective different legal sources are examined to specify models of legal knowledge and legal problem solving tasks. These legal sources are legal empirical research, legal educational practice, legal dogmatics and legal theoretical research. These models however, remain somewhat inexplicit. Therefor we combine this perspective with a knowledge engineering perspective which aims at constructing models of legal knowledge and legal reasoning that can be executed by a computer. These types of models require a high level of explicitness. This explicitness is exactly what we need in designing *e*-materials for learning the law (Valente 1995, Breuker, Bredeweg & Muntjewerff, 1999, Muntjewerff, 2000).

2.2 Empirical research for model construction

In the empirical research for model construction studies are carried out to acquire insight in the way legal practitioners and legal scientists handle legal knowledge and the way experts use legal knowledge given a specific legal task and we carry out studies to acquire insight in the way law

students handle legal knowledge and apply this knowledge in performing a legal problem solving task.

3. Legal case solving

The key activity in legal practice and legal research is legal case solving[2]. Legal case solving involves the construction of a legal solution for a specific legal case description using abstract legal rules as the problem solving devices.

A thorough analysis of legal case solving can be found in Muntjewerff (2000). Here we present the basic model of the legal case solving task (Figure 1).

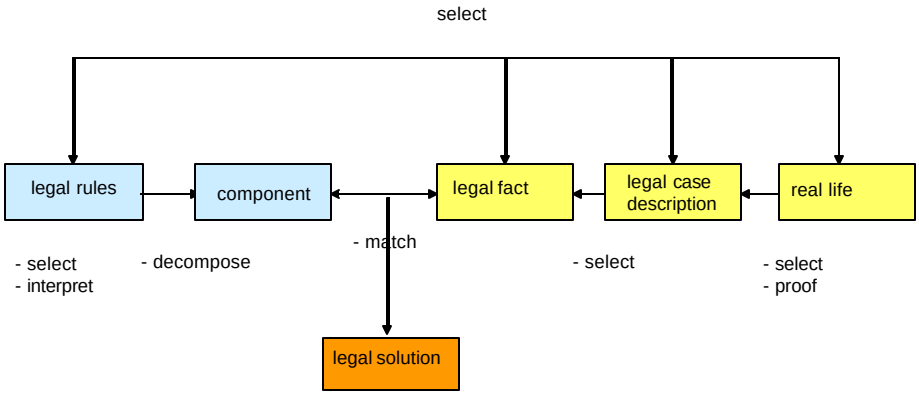

Figure 1: Basic model of legal case solving

Legal case solving involves the construction of a legal solution for a specific legal case description using abstract legal rules as the problem solving devices.

[2] Another activity in legal practice and legal research is designing legislation.

This indicates that there are three basic components in legal case solving:

- a concrete specific legal case description
- the general abstract legal rules
- the legal solution

The basic activities involved in constructing a legal solution are:

- select facts from the real life and, where required, proof these facts
- select applicable legal rules and, where required, interpret these legal rules
- decompose the legal rule into components
- select a specific legal fact from the legal case description
- select a component
- match the component to the legal fact

Legal case solving is not a trivial task. Each activity within the legal case solving task may account for specific problems and difficulties. Legal case solving starts with a real life event that is defined as a problem for which a legal solution is seen as the way to solve this problem. A *legal* solution indicates that *legal rules* are the problem solving devices. Legal rules are available in statutes and in precedents. The structure of a legal rule is: IF legal fact THEN legal consequence. This indicates that a fact in real life must be a legal fact, this means that there must be a legal consequence related to the fact within a legal rule. When there is a legal consequence for a certain fact this fact is by definition a *legal* fact. So not all facts in real life are legally relevant. Only these facts are legally relevant where a legal rule connects a legal consequence to it. So here we are confronted with two main difficulties within legal case solving: which facts to select from real life and which legal rules to select from the body of legal rules. It is even more complicated becaus these activities are strongly interrelated. To be able to select facts from real life you have to know on the basis of which legal rules you are selecting these fact: which facts are legally relevant. To be able to select legal rules you have to know what facts have occurred in real life to determine which legal rules might be applicable and thus can be selected.
To be able to select the proper legal rules one has to acquire knowledge about the system of legal rules and knowledge about the legal concepts. To be able to select the legally relevant facts from real life it is also necessary that one has acquired knowledge about the system of legal rules and

knowledge about the legal concepts. However, there is more to it. Real life is complex, disorganized, unsystematic, chaotic and incomplete. This makes it very difficult to (re)construct what has happened. Before you can state that a fact is a legal fact, because some legal rule binds a legal consequence to it, you have to be able to tell what the facts are. Here we are confronted with everything that can go wrong in fact gathering. For example, missing documents, no witnesses, lying witnesses, failing memory, contradictory evidence, no evidence, misinterpretation of facts, tunnel vision (see Wagenaar, van Koppen & Cohen,). Therefore it is very important for law student to learn how to select and proof facts from real life when confronted with a specific problem that demands a legal solution.

An empirical study was set out in which both law students (novices) and legal practitioners (experts) solve legal cases while thinking aloud. This study was carried out to examine how novices solve legal cases, what difficulties they experience and what the differences are between novices and experts with regard to solving legal cases. The legal case solving model (see Fig. 1) is used as the interpretation model to see if novices and experts use this model and if not if they are using any other system and to be able to indicate where difficulties are experienced and what might cause for these difficulties (see Muntjewerff, 2000).

When involved in the activity of constructing a legal 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 case 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. 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 a major difficulty. However, before you can state that a fact is a legal fact, because some legal rule binds a legal consequence to it, you have to be able to tell what the facts are. The complexity of legal case solving is for a large part related to the (re)construction of what has happened in real life, that is to establish the facts that occurred. Here we are confronted with the difficulties of fact gathering from real life.

4. Designing *e*-See: an instructional environment for learning to construct a legal case description from real life

The activity of constructing a legal case description from real life is not part of the legal curriculum, where in legal practice this is the main activity in legal case solving. The emphasis in legal education is on the application of legal rules to a prefabricated legal 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 legal facts in the given legal case description.

PROSA (see, for example, Muntjewerff, 2000) has been developed to support law students with exactly this part of the legal case solving task: learning to select the applicable legal rule, decompose the legal rule into components that can be matched to the selected legal facts from the legal case description (see Fig.2).

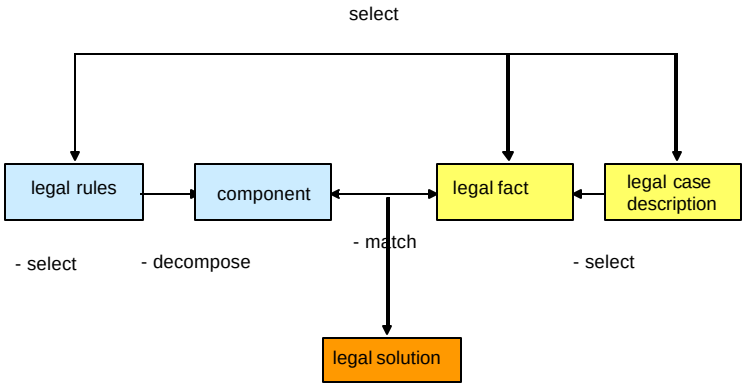

Figure 2: Legal case solving activities in PROSA

PROSA pays no attention to the construction of the legal case description. Bloembergen (1967), Drion (1966, 1977), Fernhout et al. (1988) claim that in legal practice most of the time and effort

is spent on the activities of selecting facts and proving facts to establish the legal case description. Fernhout et al. (1987) constructed the coaching system OBLIGATIO which mimics real life problem solving dialogues with clients. In OBLIGATIO the student plays the role of the legal practitioner questioning a client on the basis of an outset of a legal case. The student has to learn to ask relevant questions to complete the specific legal case presented. On the basis of the complete legal case description the student has to solve the case. 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 legal case description first and then apply legal rules to the facts of the case to construct the legal solution. The students are presented a real life situation. They are asked to reconstruct the legal case by selecting and proving the facts that they think are relevant. Where facts can only be assessed as relevant given applicable legal rules, students have to select applicable legal 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 legally relevant. It is exactly this interaction that makes legal problem solving such a complex activity. Besides that a major problem with selecting and proving facts in legal problem solving is that it may be necessary to actually observe facts in real life.

Given the difficulties with (re)constructing the legal case description the remedies proposed to support students in constructing a legal case description are 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 it 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 legal case description by herself. By actually having the student work on the construction she may experience what it takes to construct a legal 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 legal case description from a real life.

4.1 Coaching System *e*-See

e-See is an instructional environment for learning to construct the legal case description involving the selection and proving of facts from real life. Most of the existing legal instructional materials are training tools or, as they are referred to in the Artificial Intelligence & Education community, coaching systems. Coaching systems are computer programs that provide an environment for students to acquire skills in applying domain knowledge and that assess and correct students in their performance. In a coaching system the student performs a task and the system interprets the performance of a student; that is it monitors discrepancies between intended results and actual results. If a discrepancy is identified this is viewed as an error or inefficiency, a deviation from what should be the case. Errors are assumed to have causes, and the identification of causes of errors is called diagnosis (see Fig. 3).

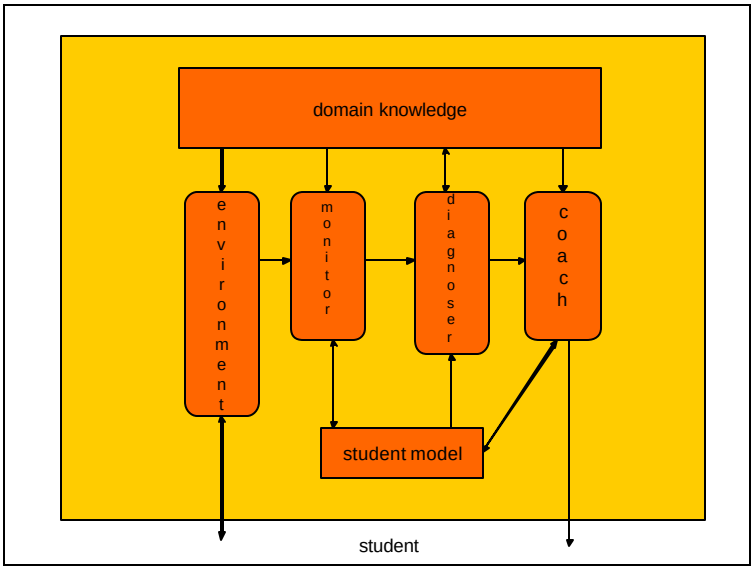

Figure 3: Coaching System

The following functional components are distinguished within a coaching system:

- *an environment* to enable the task to be learned or trained

- *a monitoring component* to observe and interpret the student's behaviour 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 (see, for instance, Wenger, 1987)
- *a student model*. A repository where the information about the student is collected to built a model of the individual student (see, for instance, Sleeman & Brown, 1981). The model keeps track of the changes in behaviour and registers what the student is doing and how she does it.

Coaching systems may differ in three major factors.

The first factor is the degree of similarity of the environment presented to learn the task 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[3].

4.2 The environment in *e*-See

A task is performed in an 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 in the real life setting.

These coaching systems present the user the real environment, not a simulation, and offer help to the user during task performance. In general, however, the environment in a coaching system is not a real environment, but a representation of reality, that is a simulation.

Simulation environments can vary to a considerable extend in the way in which reality is represented. Two major categories of simulation environments can be distinguished: model based and non-model based.

[3] Coaching systems also vary in the way the knowledge is explicitly represented in the system. Systems that use an implicit knowledge representation encode decisions not knowledge (Wenger 1987, Sergot 1991). These systems are for that reason classified as non-intelligent. Systems that do explicitly encode the knowledge are labelled as 'intelligent'.

A model based simulation uses generic models[4], which enable the generation and interpretation of all possible situations on the basis of these models, whereas in a non-model based simulation all information needed for performing the task, has to be made explicit on forehand.

The different ways in which the real environment is conceptually simulated is one aspect of a simulation. The conceptual qualities are related to the fact that a simulation must have a correct conceptual correspondence with the real life task to be trained or learned. When there is no conceptual correspondence the simulation is nothing more than facade. These should be distinguished from the sensory qualities of a simulation. The sensory qualities refer to the amount in which the sensory experience in the simulation is identical to the real life experience (for example, in simulating a factory the noise and stench are included). Showing a video of a real task environment, for example, showing the proceedings of a case before the court may have high sensory qualities.

In *e*-See we combine both the conceptual and sensory qualities in the simulation. The conceptual qualities are guaranteed where the components and characteristics of the activities involved in the construction of a legal case description are made explicit.

The sensory qualities are guaranteed by using video materials of a real life dispute in a real life situation.

4.3 The domain knowledge in *e*-See

Legal case solving requires the availability of legal knowledge. This knowledge can be found in the legal rules. Within *e*-See the legal rules are available to the student. There is also a list of basic concepts available to the student. These concepts in turn link to legal sources (see also Muntjewerff et al 2003, Muntjewerff 2000).

To be able to handle the complexity of real life when performing the task of constructing a legal case description law students are presented a table consisting of elements. These elements help to diminish the complexity of real life and help to focus on the main issues to support the

[4] There are two types of generic models: behavioural models and structural models. A behavioural model can either be quantitative or qualitative. Quantitative behavioural models miss matching structural models. These structural models, however, are available with qualitative models that enable a mapping between a behavioural description and input/output relations.

gathering of facts from real life. These elements see to procedural aspects as well as content (see Table 2).

legal area	private law public law
parties involved	plaintiff defendant
claim	claim plaintiff claim defendant
facts	non-disputed facts disputed facts facts
applicable legal rules	

Table 2: Elements used in the construction of the legal case description

4.4 The coach in *e*-See

A distinction is made between the environment and the coach. Where the environment simulates the problem situation that defines the task to be learned, in e-See being the construction of the legal case description; the coach sees to the learning 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 (see, for instance, Berkum & de Jong 1991, Jong de, van Joolingen, Scott, de Hoog, Lapied & Valent 1994). 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 (see, for instance, Lester, Converse, Stone, Kahler & Barlow 1997, Shaw, Ganeshan, Johnson & Millar, 1999).

In *e*-See the student can explore within the boundaries set by the task environment. There are two types of support available in *e*-See: support on demand and immediate feedback.

4.5 *e*-See interface

The interface of *e*-See visualizes the instructional environment we present to the student to learn to construct a legal case description. The design of the screen constraints the ways the legal case description can be constructed. We argued that it might be more supportive to present an environment in which the basic 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 *e*-See is "divide & conquer". We not only made a distinction between 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.

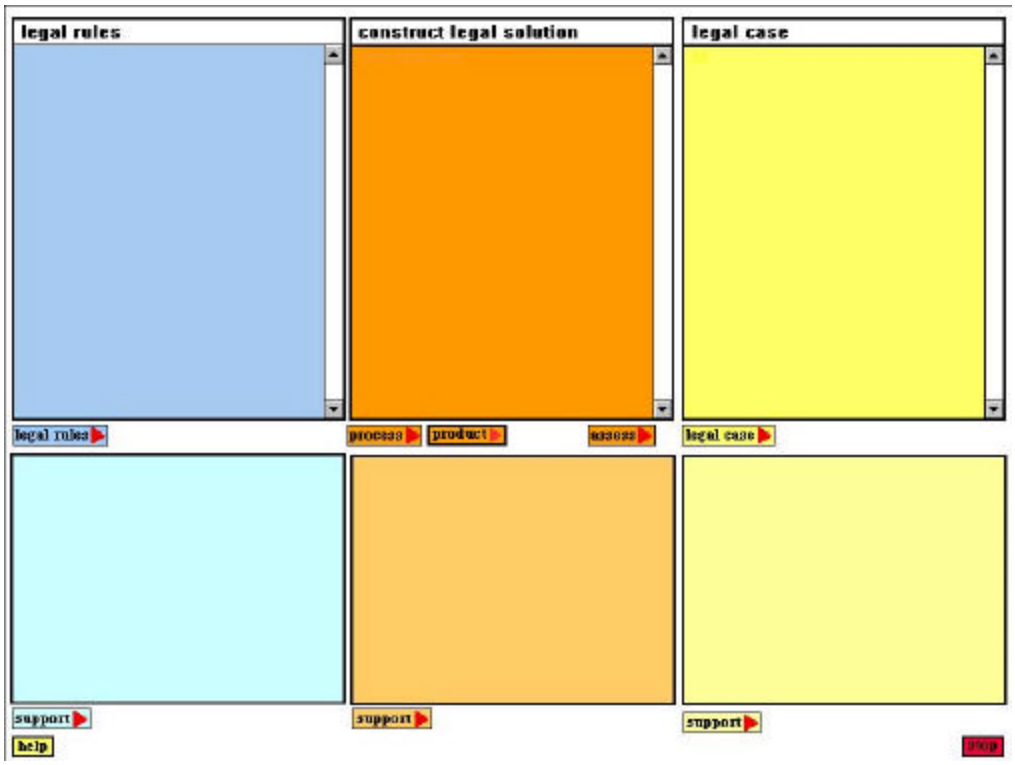

Figure 4: *e*-See interface

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 colour has functionality in distinguishing the subsequent components that play a role in legal case solving.

There are three different components, so there are three different windows, with each a specific colour. The real life window is yellow, the construct legal case description window is orange and the legal rules window is light blue.

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

The legal rules window contains the legal rules, that is, the 'theory' that should be applied to the real life situation in the real life window in the upper layer. The student can select a real life case and legal rules.

The middle window in the upper layer the construct legal case description window is where the student constructs her legal case description. 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 structure. The construct legal case description window 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 construct legal case description window. The student may also ask for elaborations (support buttons) on the real life situation, the legal rules or the legal case description to be constructed. This support is then presented in the respective window in the lower layer.

These distinctions were realized in the interface in such a way that it presents students with an environment that makes it easy to "conquer" the construction of a legal case description.

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 components, their content and their functionality which in turn may support a systematic approach to constructing the legal case description.

5. Realising *e*-See

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 is developed using HTML and JavaScript. For the video editing Avid Xpress DV has been used (DeTombe 2003a, DeTombe 2003b, DeTombe 2003c). 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 proof facts in constructing a legal 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 have been added to facilitate maintenance and re-use (see also Muntjewerff et. al. 2003) (see Fig. 5).

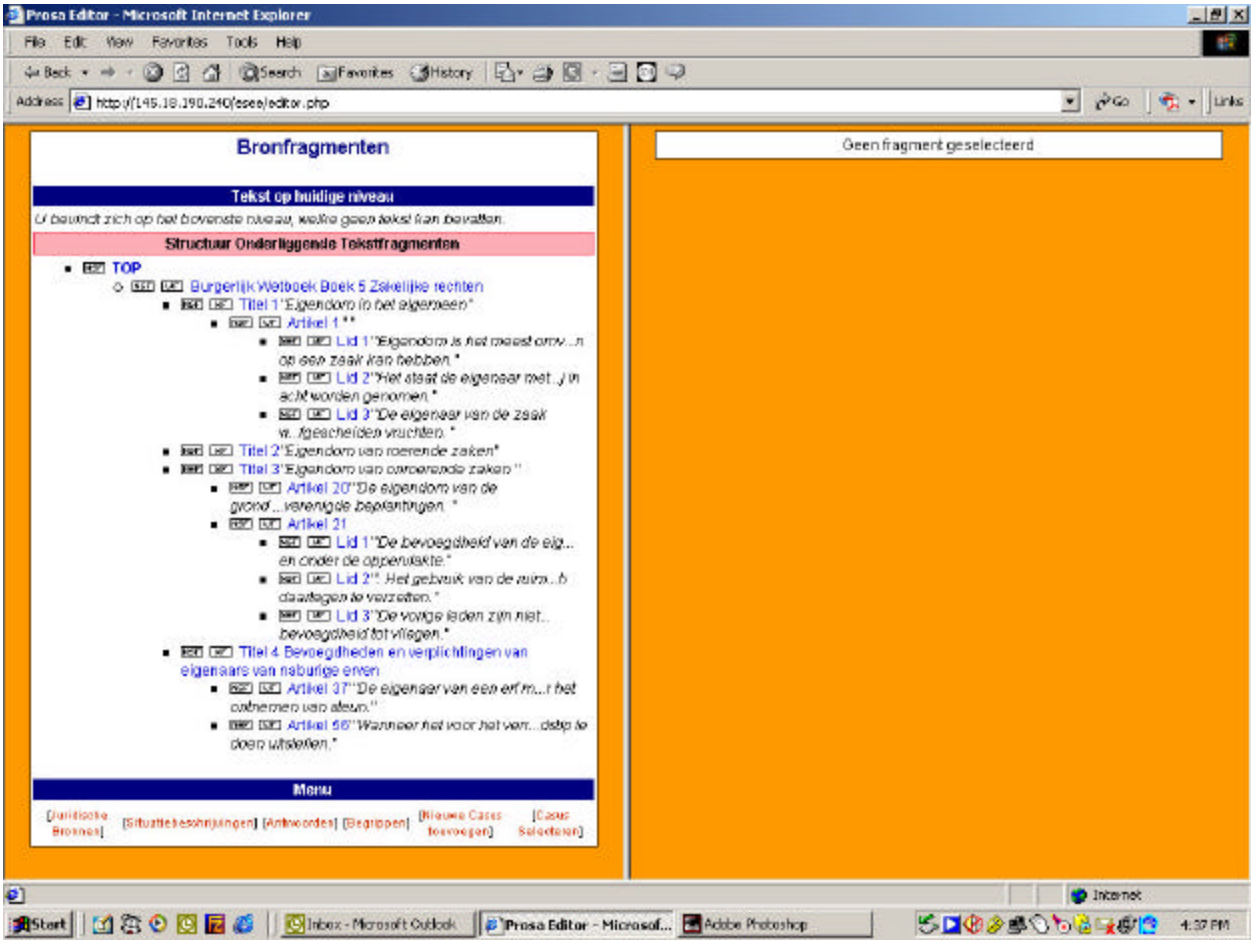

Figure 5:Editor in *e*-See

5.1 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. 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 (see Fig. 6).

Within *e*-See, the real life dispute is available as a video presenting the entire real life dispute. Next to that the real life dispute is also made available in stills showing the constituent parts of the real life dispute. There is a database with videos of real life disputes. Each video is about fifty minutes. The student may select a real life dispute video from the database. The student can opt for watching the entire video, or she may opt for watching parts of the video (beginning, middle, end).

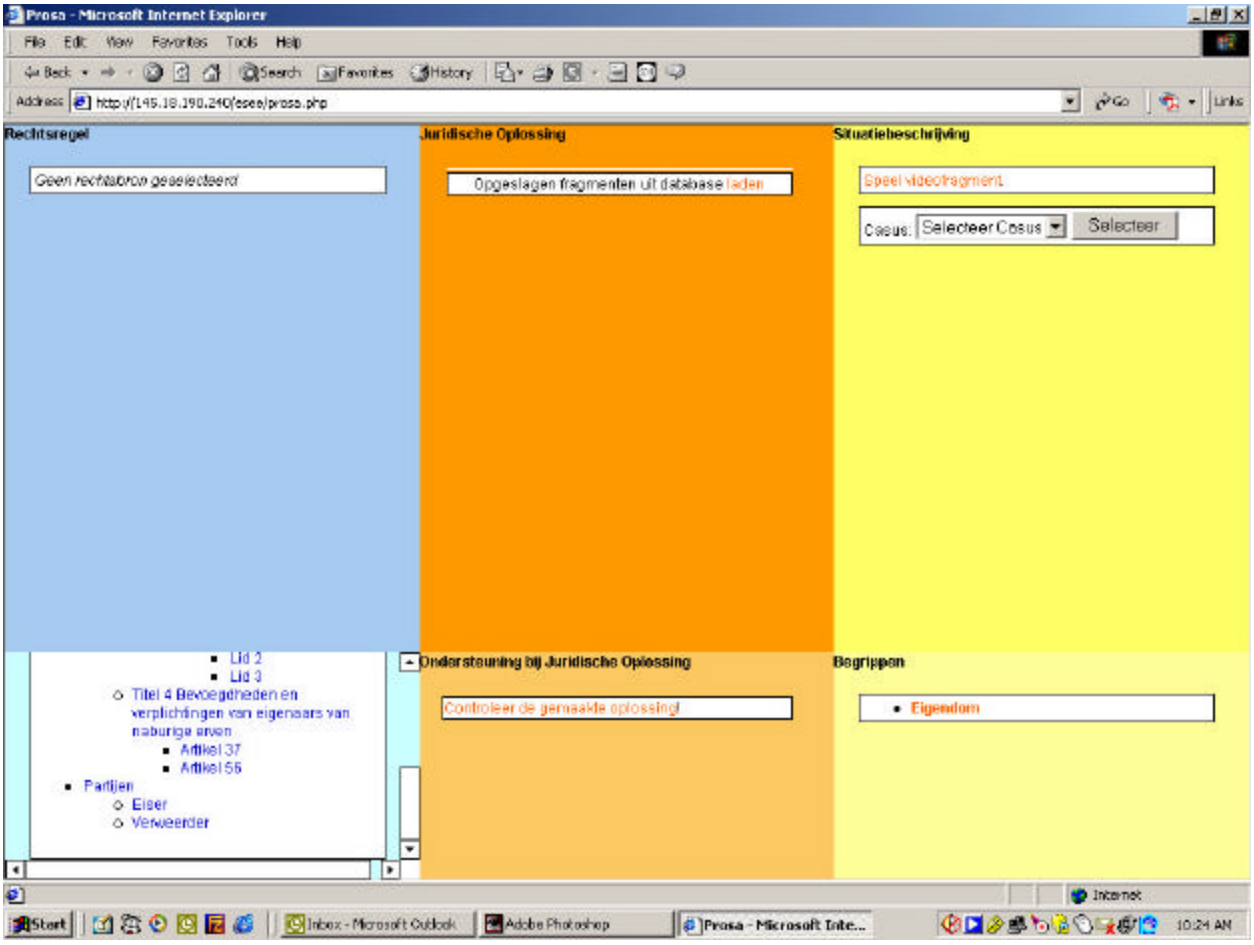

Figure 6: Select a real life dispute

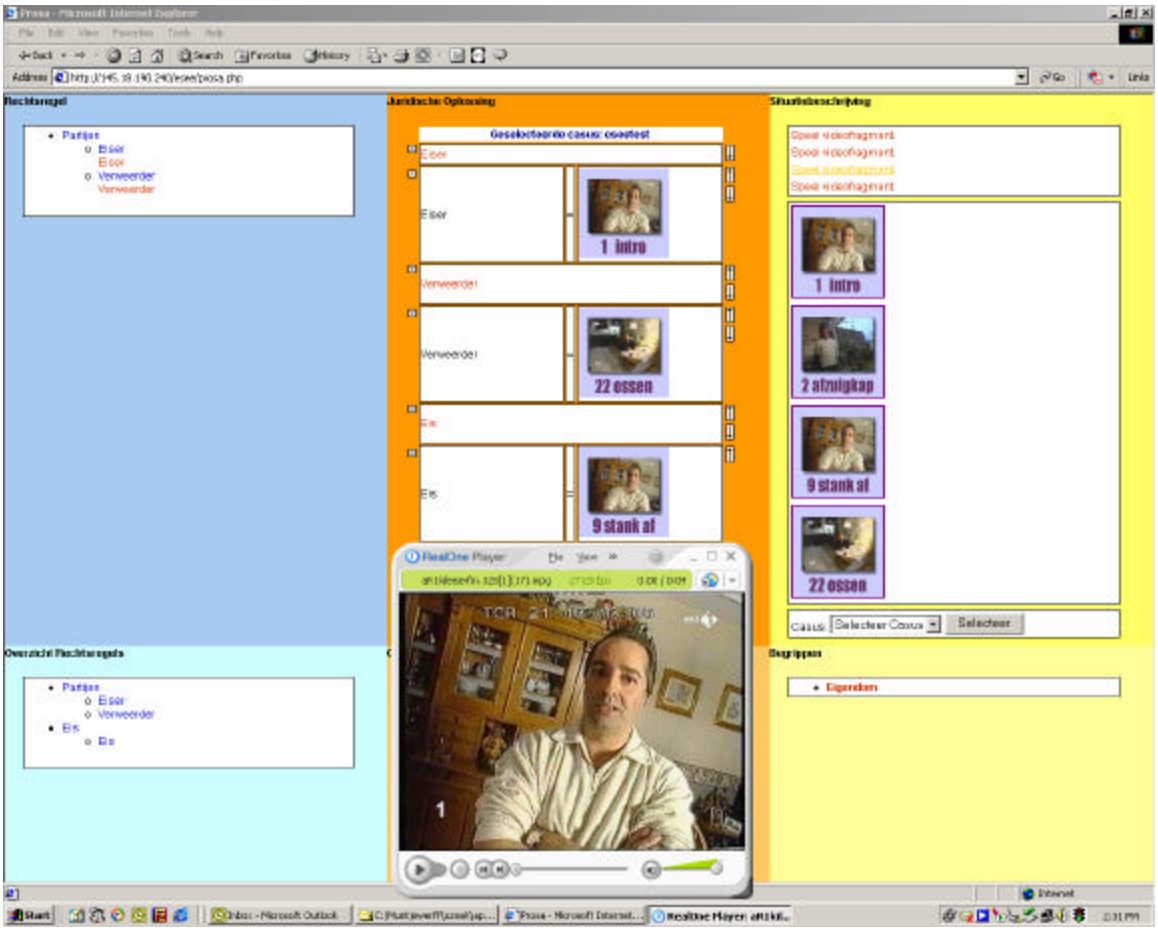

Figure 7: Run a video fragment

The video player is equipped with the usual control buttons and with an extra *select still* button. In the construct legal 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 legal case description (that is party, claim, facts, and rule). These elements correspond with the available stills of the real life dispute.

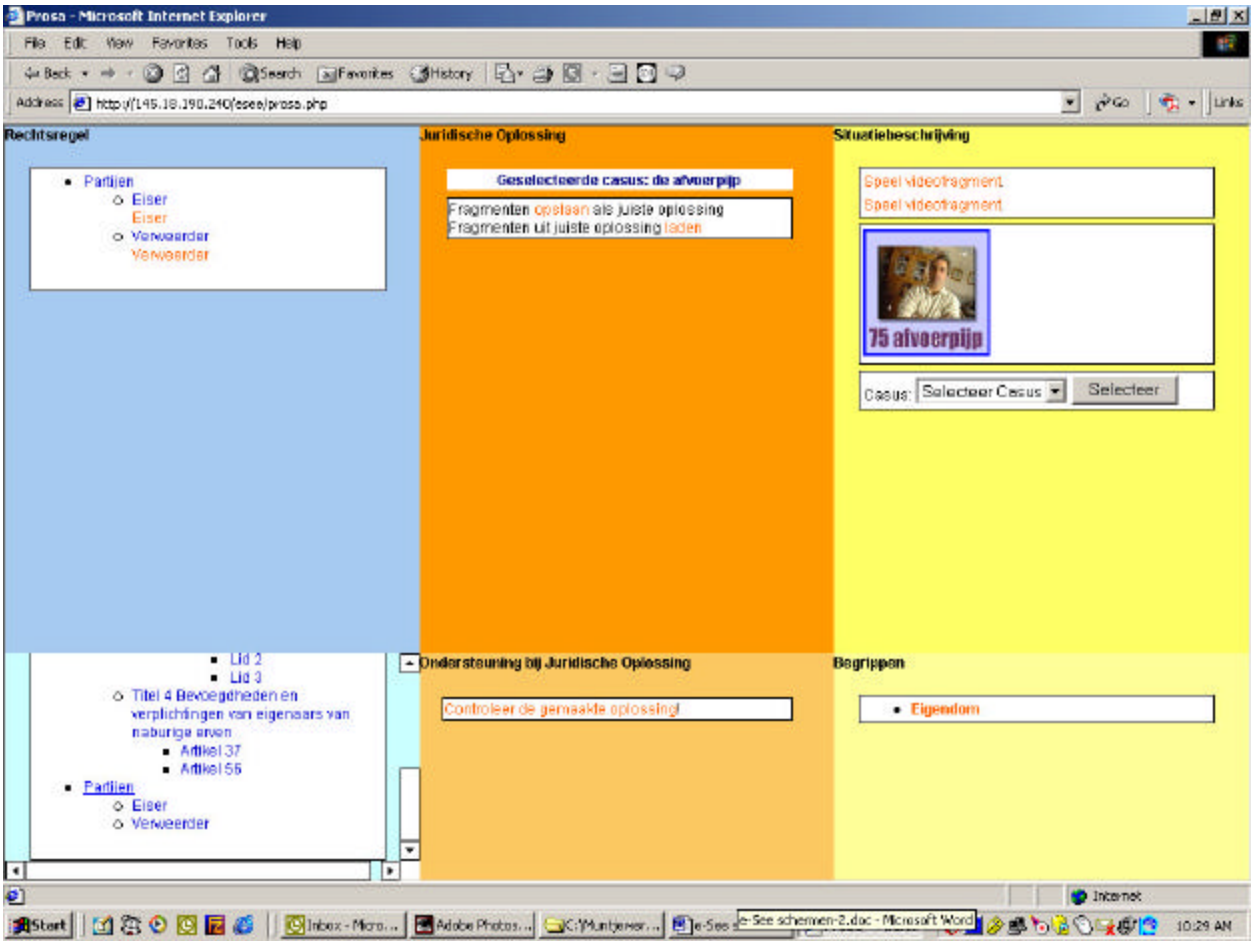

Figure 8: Select an element

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 legal case construction part of the screen (see Fig. 9).

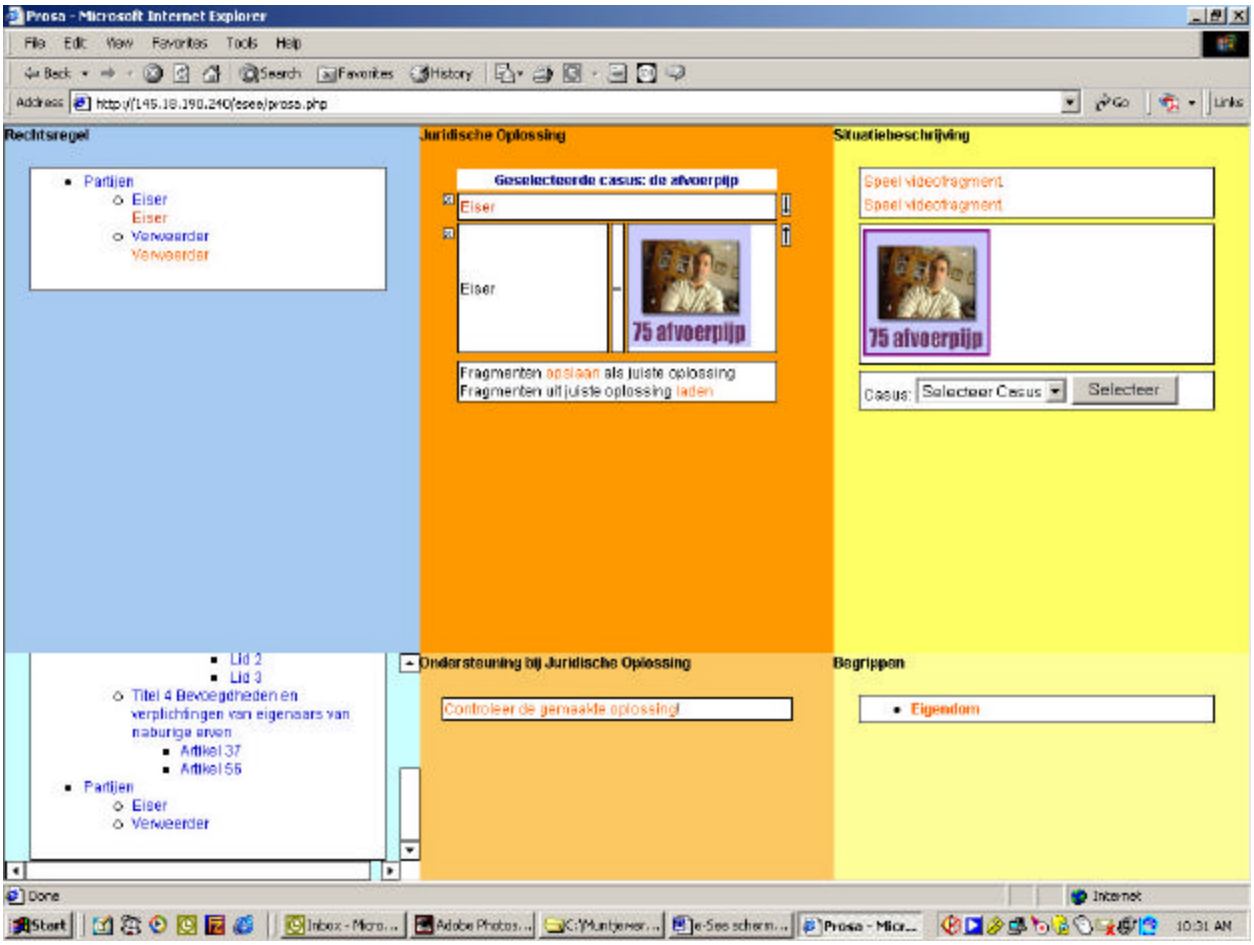

Figure 9: Match fact from real life to element

Where the video is fragmented in stills and supplied with matching text fragments the text fragment is presented in the legal case construction part of the 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. By using both the legal rule and the elements presented in the construct legal case description screen the student may construct a legal case description from the real life situation. The student constructs the legal case description by selecting stills form the real life dispute to be matched to the elements selected from the legal rules part of the screen. The series of stills that results from this activity pictures the legal case description.

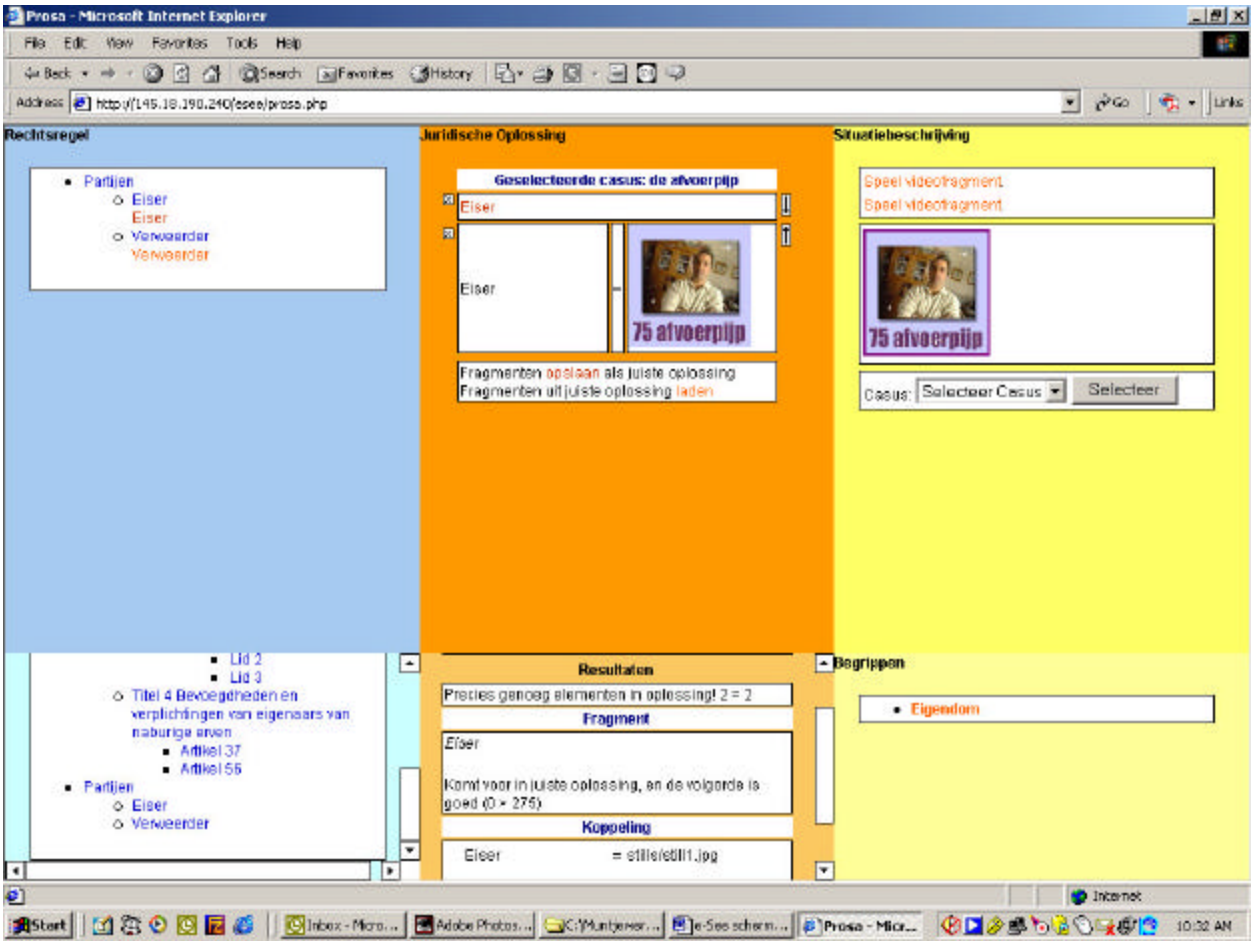

Figure 10: Feedback

5. Future research

e-See is designed to support law students in constructing a legal case description from a real life situation. By integrating video in the instructional environment real life can be presented to the student and in this way the complexity of a major part of legal case solving is brought into legal education. One of the objectives in the project is to see in what way video can have an added value in learning legal problem solving in a more effective and efficient way. Therefore the next step is to test the application by having law students' work with the application to evaluate *e*-See (see, for example, Muntjewerff, 2000, Kanselaar & DeTombe, 1991).

References

Berkum, J.A. van & T. de Jong (1991). Instructional environments for simulations. *Education & Computing* 6, pp. 303 - 358. Amsterdam: Elsevier.

Bloembergen, A.R. (1967). Het belang van de rechter als persoon. *Ars Aequi*, XVI, pp. 129 - 132. (The implications of the judge as a person).

Boezerooy, P. Duyijvestijn, M., Ederveen, M., Groen, P.W.C. , Kulk, R and A. Muntjewerff (2003). *Projectdefinitie Integratie Video in het Onderwijs. Project Digitale Universiteit.* (Project Definition Integrating Video in Higher Education. Digital University project).

Breuker, J., Muntjewerff, A. & B. Bredeweg (1999). Ontological Modelling for Designing Educational Systems. In: Proceedings of the Workshop on Ontologies for Intelligent Educational Systems at AIED99. LeMans.

Brooks, D.W., Nolan, D. E. and S.M. Gallagher ( ). Web-Teaching. A Guide to Designing Interactive teaching for the World Wide Web. Kluwer.

Crombag, H.F.M., van Koppen, P.J. & Wagenaar, W.A. (1992). *Dubieuze Zaken. De psychologie van strafrechtelijk bewijs.* Amsterdam: Uitgeverij Contact. (Dubious Cases. The psychology of criminal evidence).

DeTombe, D.J. (2003c). Streaming video applications: Art films Anna Abee. Strukturen. Amsterdam: ArtCoaching International Publisher. ISBN 90-77377-02-6

DeTombe, D.J. (2003b). Streaming video applications: Art films Anna Abee. Food. Amsterdam: ArtCoaching International Publisher. ISBN 90-77377-03-4

DeTombe, D.J. (2003a). Streaming video applications: Art films Anna Abee. Embarque. Amsterdam: ArtCoaching International Publisher. ISBN 90-77377-07-7.

DeTombe, D.J. (1994). *Defining Complex Interdisciplinary Societal Problems.* A theoretical study for constructing a co-operative problem analyzing method: the method COMPRAM. Amsterdam: Thesis Publishers.

Drion, H. (1966). Bewijzen in het recht. *Rechtsgeleerd Magazijn Themis*, 1966, pp. 406 - 407. (Prove in law).

Drion, H. (1977). Het 'regressieve redeneren' van de rechter. *RM Themis*. pp. 551 - 555. (The ‘regressive reasoning’ of the judge).

Fernhout, F., Otto, R., Span, G. & van Rijthoven, F. (1988). 'Arrondissement Nieuwenhof': een oefenrechtbank gebaseerd op simulatie van de juridische werkelijkheid. *Ars Aequi, 37 (5),* 1988, pp. 373 - 379. (District Court Nieuwenhof: a moot court based on a simulation of legal reality).

Fernhout, F.J., Cohen, M.J., Crombag, H.F.M., Pinckaers, R. & Temme, W. (1987). OBLIGATIO: computer simulatie van juridische casus. In Grave, W.S. de & Nuy, H.J.P. (1987). *Leren studeren in het hoger onderwijs. Perspectieven voor integratie.* Almere. (OBLIGATIO: computer simulation of legal cases).

Jong, T. de, W. van Joolingen, D. Scott, R. de Hoog, L. Lapied & R. Valent (1994). SMISLE: System for Multimedia Intergrated Simulation Learning Environments. In Jong, T. de & Sarti, L. (Eds.). *Design and Production of Multimedia and Simulation-based Learning Material*. Dordrecht: Kluwer Academic Publishers.

Kanselaar, G. & DeTombe, D.J. (1991). *Courseware Evaluatie. Een instrument ter beoordeling van de onderwijskundige en algemeen didactische aspecten van programma's voor computer ondersteund onderwijs.* De Lier: Academisch Boeken Centrum. (Courseware evaluation. A tool for assessing the educational and general didactical aspects of programs for computer assisted instruction).

Lester, J.C., S. Converse, B. Stone, S. Kahler & T. Barlow (1997). Animated pedagogical agents and problem-solving effectiveness: A large-scale empirical evaluation. In *Proceedings of the Eight World Conference on Artificial Intelligence in Education*, pp. 23 – 30. Amsterdam: IOS Press.

Maharg, P. & A. Muntjewerff (2002). Through a Screen, Darkly: Electronic Legal Education in Europe. *The LawTeacher. The International Journal of Legal Education. Legal Education in Europ*. London: Sweet & Maxwell. Volume 36, number 3, pp. 307 – 332.

Muntjewerff, A.J., Jordaans, A., Hoekstra, R. and R. Leenes (2003). Case Analysis and Storage Environment – CASE in D. Bourcier (ed.), *Legal Knowledge and Information Systems. Jurix 2003: The Sixteenth Annual Conference*. Amsterdam: IOS Press, 2003, pp. 1-10.

Muntjewerff, A.J. (2002c). Principled and Structured Design of Electronic Materials for Learning the Law in T.J.M. Bench-Capon, A.Daskalopulu and R.G.F. Winkels (eds.), *Legal Knowledge and Information Systems. Jurix 2002: The Fifteenth Annual Conference*. Amsterdam: IOS Press, 2002, pp. 133-142.

Muntjewerff, A.J. (2002b). HYPATIA research program. Models of Legal Knowledge and Legal Reasoning in Electronic Materials for Learning the Law. Amsterdam: University of Amsterdam. ISBN 90-806969-1-9.

Muntjewerff, A.J. (2002a). Evaluating the Instructional Environment for Learning to Solve Legal Cases PROSA. In Gustavo A. Santana Torrellas ans Vladimir Uskov (eds.). Proceedings of the IASTED International Conference Computers and Advanced Technology in Education. Anaheim Calgary Zurich: ACTA Press: , pp. 374 - 379.

Muntjewerff, A.J. (2000). *An Instructional Environment for Learning to Solve Legal Cases. PROSA.* Amsterdam: University of Amsterdam.

Muntjewerff, A.J. & J. Groothuismink (1999). Supporting the Learning of Legal Case Solving using a Computer Program as the Instructional Environment. In *Proceedings CATE'99 Computers and Advanced Technology in Education*. Philadelphia, USA: IASTED.

Sergot, M. (1991). The Representation of Law in Computer Programs: A Survey and Comparison of Past and Current Projects. In BenchCapon, T.J.M. (Ed.). *Knowledge Based Systems and Legal Applications*. London: Academic Press.

Shaw, E., R. Ganeshan, W.L. Johnson, & D. Millar (1999). *Building a Case for Agent-Assisted Learning as a Catalyst for Curriculum Reform in Medical Education.* http://www.isi.edu/isd/ADE/ade-body.html.

Sleeman, D. & Brown, J.S. (Eds.) (1982). *Intelligent Tutoring Systems.* London: Academic Press.

Smith, C.E. (1998). Feit en rechtsnorm: een methodologisch onderzoek naar de betekenis van de feiten voor de rechtsvinding en legitimatie van het rechterlijk oordeel. Maastricht: Shaker Publishing. (Fact and legal norm: a methodological study into the meaning of facts for adjudication and legitimating of a legal judgement.).

Valente, A. (1995). *Legal Knowledge Engineering*. Amsterdam: IOS Press.

Wenger, E. (1987) *Artificial Intelligence and Tutoring Systems. Computational and Cognitive Approaches to the Communication of Knowledge*. Los Altos, California: Morgan Kaufmann Publishers inc.