An instructional environment for learning to solve legal cases: PROSA

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8.1 Contributions

This thesis addresses the problem of arranging instruction for law students to support efficient and effective learning of legal case solving. The contributions of our research are:

- a precise description of students' difficulties with legal case solving
- a precise description of the causes for these difficulties combined with remedies
- a set of requirements for arranging an instructional environment
- PROSA, the instructional environment that is effective in improving students' legal case solving performance

In the Seventies extensive investigations by Crombag and colleagues (Crombag & van Tuyll van Serooskerken, 1970, Crombag et al. 1971, 1972, 1977) revealed that students do not work in a systematic way when solving a legal case, i.e. it appears that students do not apply (consistently) a method. They assigned the lack of a method for legal case solving to be responsible for students' difficulties. As a remedy they therefore constructed a method and materials to instruct this method to students. However, this approach did not turn out as effectively as expected. This conflict between the claim that the lack of a method causes students' unsystematic legal case solving performance while at the same time instructing a method did not help intrigued us. Was a lack of method in fact not the real cause? Was the remedy not a good one?
We agree with Crombag and colleagues that students experience difficulties in solving legal cases. However, to be able to solve the paradox between the identification of a cause - no method - and no effect of the most obvious remedy - instructing a method - we needed to revisit the interpretation of their observations that students work in an unsystematic way. It could be that unsystematic problem solving is not the (sole) cause of students' difficulties. It could be that this unsystematic behavior is not caused by not using a method. Unsystematic problem solving behavior is identical to not consistently using one single method. It does not necessarily follow that students do not use a method; students may have used a variety of individual methods, and different ones for different cases. Lack of using an articulate method may not have been the cause of students' problems at all, but rather the consequence of some deeper or 'earlier' cause, e.g. insufficient mastery of, or insight in, the subject matter, i.e. the legal source, its concepts and structure. We therefore repeated the thinking aloud studies. However, we were able to construct an interpretation model to analyze our protocols that enables the identification of method as well as content due to the current state of the art in problem solving research. Current views on problem solving provide means to distinguish the role of content and method in problem solving. Particularly in the field of knowledge engineering ontologies are introduced as a means to express content. These insights and tools were not yet available in the Seventies. Educational research has been concerned rather with methods than with concepts and its structure. Methods of instruction, training and evaluation have been the major topic of research. Currently more attention is paid to instructing content than to instructing methods. This rediscovery of content may be due to the fact that there is more experience with expressing knowledge. Although this may only be a trend, it cannot be denied that content is a key issue in instruction, as any teacher can confirm.

8.1.1 Difficulties and Causes

The results of our thinking aloud studies first of all showed that students are less unsystematic than we assumed. Our thinking aloud studies showed that students are incomplete in selecting elements from the situation description, they miss elements in the abstracted situation description and they miss elements in the reasoning structure. As a consequence they construct incomplete and incorrect legal solutions.
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Students have problems with understanding the situation description in legal terms, with managing the information and with finding their way in the legal knowledge. Students appear to have no problems with methodical work, but rather with finding their way in, and applying the knowledge implied by, the legal source. Problems of students are not caused by a lack of a method. Legal knowledge plays a determining role in solving legal cases. Insufficient mastery of, or insight in, the legal knowledge causes the difficulties we observed. This becomes even clearer when we compare students to experts. Experts who solved a legal case in their field of expertise worked in a systematic way, they recognized the problem situation, they found the applicable knowledge and they constructed a correct legal solution. However, when they had to solve a legal case outside their field of expertise their performance resembled that of the students. If using a method is responsible for correct legal case solving performance the experts should have had no problems with the case outside their field of expertise.

<table>
<thead>
<tr>
<th>Students have problems in:</th>
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<tbody>
<tr>
<td>• recognizing the problem situation,</td>
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<tr>
<td>• keeping track of intermediate results, and/or</td>
</tr>
<tr>
<td>• finding the applicable knowledge</td>
</tr>
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</table>

8.1.2 Remedies

We therefore decided that during task performance students need to be supported in managing their information and in acquiring an explicit conceptual structure of the knowledge in the domain. We emphasized systematic guidance during problem solving to support the student in keeping on track and building up a complete and correct legal solution by bits and pieces. Restricting the activities during problem solving helps the student to focus on the key activities in legal case solving. In learning to solve legal cases it appears that the problem is to come to grips with content rather than with method. This is due to the fact that there is a basic difference between the ability to understand the legal knowledge and the ability to use this knowledge in constructing a legal solution for a specific problem situation. The structure of the text of a regulation is different than the explicit conceptual structure.
Students have to acquire an explicit structure of the legal knowledge next to the legal source text structure. This explicit structure can only be acquired by actually applying the legal knowledge. However, support can be organized to facilitate the acquisition of such an explicit structure. We used the functional ontology of law (FOLaw) to express the knowledge in our domain of practice (Valente, 1995). FOLaw not only enables the explicit formulation of the content, it also expresses the way in which the content is used in problem solving. In this way the reasoning, or problem solving, process is made visible. To acquire a conceptual representation a functional differentiation of knowledge may help, because it distinguishes the knowledge on the basis of their function in solving a legal case.

Proposed remedies:
- Support students in managing their information
  - Systematic guidance
  - Restrict activities
- Support students in acquiring the explicit structure
  - Functional differentiation of knowledge

### 8.1.3 PROSA

PROSA was designed using the requirements formulated on the basis of our theoretical analysis of problem solving and legal case solving, and the findings of our thinking aloud studies. Working with PROSA is more efficient than solving cases the traditional way for the following reasons. PROSA takes over the managing of information by externalizing materials, intermediate steps and intermediate results in an automatic way. PROSA facilitates the acquisition of a conceptualization of the legal knowledge by differentiating the knowledge on the basis of its function in legal case solving. Working with PROSA is also better than solving legal cases the traditional way, because the student actively engages in legal case solving. The student actually "goes through the problem" and learns to differentiate the knowledge and to construct a complete and correct legal solution.
8.1.4 PROSA Helps

Students who worked with PROSA showed a strong improvement in their legal case solving performance, where students who did not work with PROSA did not. The effect of PROSA shows a difference between the experimental group's pre- and post-test means of, conservatively estimated, one and a half standard deviation. Such a strong effect is unusual. Moreover, where usually the best students learn the most, the PROSA effect appeared to be independent of the students' initial level of performance.

PROSA students did not perform better on the official exam than Non PROSA students. This later problem was explained by the major difference between PROSA's and the examiners' way of grading legal solutions. The teachers' way of scoring and the PROSA way of scoring are so different that no correlation is found between the official scores and those done the "PROSA way". The effect of PROSA manifested itself after re-grading the legal solutions the "PROSA way". This effect could not be found when the official exam score was applied.

PROSA has a strong effect, but:
(1) the effect is independent of students' initial level of performance.
(2) the effect is dependent on the way the students' solutions are scored.

8.2 Justifying the grading model in PROSA

The "PROSA way" of scoring gives a strong effect, while the teachers' way of scoring the same solutions gives no effect. The same answer was scored the "PROSA way" and the teachers' way. There was no correlation between the teachers' scores and those done the "PROSA way". We therefore have to conclude that both ways of scoring assess different issues.

PROSA instructs legal case solving as the construction of a complete and correct legal solution. A complete solution consists of a case model, an argument structure and a conclusion.

The first component in a complete solution is the case model. The case model, or situation model, is a description of the level of understanding of the problem. Understanding the incomplete situation description results in the construction of a partial model of the problem situation. To solve a problem, that is being confronted with an incomplete situation description, is in fact no more than to complete the situation model.
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To be able to construct and complete a situation or case model requires knowledge regarding the problem situation. When, for instance, it concerns physics problems the problem solver must really know what the problem is to be able to solve it.

To be able to know what the problem is she should be able to recognize objects in the situation description on the basis of her knowledge about physics. When the problem situation describes a bicycle tire and bicycle pump she should be able to recognize these objects as being canonical objects (a balloon and a piston) in thermodynamics. Both the PROSA way of scoring and the teachers' way of scoring do not assess the student's understanding of the situation description. Both scoring models do not assess the completeness of insight in the situation description. The reason that PROSA does not score the students' understanding of the situation model is based on the fact that the situation descriptions used in law are mainly stated in common sense terms. The actual problems law students' experience are concerned with the mapping of the common sense terms to the legal terminology.

The second component in a complete legal solution is the argument structure. The argument structure contains the justification of the conclusion, i.e. it contains the information why hypothesized solutions are rejected and what reasons there are - except for the fact that it is not rejected yet - for accepting the conclusion. PROSA, and therefore also the scoring system that goes with PROSA, emphasizes this argument structure, i.e. it requires as much as possible that the student gives explicit reasons (reference to legal articles) that support the conclusion. PROSA 'knows' about which of these arguments are applicable and relevant, and therefore requires from the student a complete solution rather than a solution supported by an argument. The scoring model of the teachers in turn does not assess the argument structure. They only partially assess the component directly linked to the conclusion.

The final component that makes a complete solution is the conclusion. The conclusion is the answer to the question posed by the problem. The conclusion has the role of the main result. In PROSA the argument structure leads to, or results in, a conclusion. The conclusion is the answer to the question that comes with the situation description. The conclusion can either be right or wrong. The teachers' scoring model also assesses the correctness of the conclusion.
Where PROSA assesses a legal solution consisting of both the argument structure and the conclusion, teachers assess the correctness of the conclusion, where they only partially assess the argument structure. That is, they only assess the component linked to the conclusion. To summarize:

<table>
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<tr>
<th>Scoring model</th>
<th>PROSA</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case model</td>
<td>not assessed</td>
<td>not assessed</td>
</tr>
<tr>
<td>Argument structure</td>
<td>assessed</td>
<td>not assessed</td>
</tr>
<tr>
<td>Conclusion</td>
<td>assessed</td>
<td>assessed</td>
</tr>
</tbody>
</table>

Table 8.1: Scorings models compared.

The teachers only assess the conclusion. As a consequence the weight of the score is put on the conclusion. A student will receive scores for the right conclusion, and no scores for a wrong conclusion. However, it could be the case that a student just guessed the right conclusion, where it could also be the case that a student comes down with a wrong conclusion on a, more or less, complete and correct argument structure.

We were quite unexpectedly faced with these differences in assessing a legal solution. As a result of it we are confronted with theoretical as well as practical problems. The theoretical problem is that students are assessed on the same text using two different grading models resulting in extreme differences in scores. The PROSA score, however, appears to be related to the intended effect of the instruction provided by PROSA.

When we take position that the way PROSA assesses a legal solution is the right way, which is one to one related with the way PROSA instructs the construction of a legal solution, we are confronted with a practical problem. The way teachers score the legal solutions of students is then either inaccurate or it has a different focus. The teachers only assess the conclusion. As a consequence students whose conclusion is wrong do not receive any points, even when parts of the argument structure may be correct. In PROSA the argument structure and the conclusion are assessed, where a student whose conclusion is wrong can receive points for correct components in the argument structure.
We claim that the argument structure is essential in the legal solution. In their future work as legal practitioners they have to defend a case on the basis of arguments or they have to motivate their legal decision in a case.

8.3 What Is to Be Done

We first discuss the major issues of further research and extending the types of knowledge. We then discuss some remaining issues regarding the subsequent development of PROSA.

8.3.1 Further Research

PROSA has a strong effect. However, we made two comments. The first is that this effect is independent of students' initial level of performance. We would like to find out why this is the case. Is it because PROSA instructs a very specific skill, or because students' did not have much training in this type of skill? Further research is necessary to be able to answer these questions.

The second comment is that the effect of PROSA is dependent on the way the students' solutions are scored. There is evidence that the PROSA way of scoring is related to the intended effect of the instruction provided by PROSA. However, it could be that PROSA is too specific. To be able to shed light on this issue we need more evidence on the relation between the teachers' way of scoring and their intended instruction.

8.3.2 Extending Types of Knowledge

We used the FOLaw to analyze the domain of practice. This resulted in the distinction of the different types of knowledge that play a role in solving legal cases in this domain.

To support the student in acquiring understanding of, and insight in, the content a functional differentiation of knowledge may help, because it distinguishes the knowledge on the basis of their role in the legal case solving process. However, in PROSA we now only realized the separation and representation of the definitional knowledge. This leaves us with separating and representing the other types. For example, normative knowledge also plays a role in administrative law. Support could be added by representing the structure of a norm in a graphical representation.
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However, the relation with the text structure should remain intact, it should be made to fit the size of the screen and it should be able to easily maintain the representation.

The procedural aspects are very important in administrative law. Therefore we should find ways to represent key aspects as sequence and documents. We may also think of ways to show the different types of knowledge in the text structure of a statute, for example, by using different colors or text styles for each type of knowledge.

8.3.3 Subsequent Development of PROSA

The subsequent development that is planned sees to the addition of cases, the extension of the legal sources and the support and the incorporation of other domains in PROSA.

8.3.3.1 Add cases

The version of PROSA we used in the field test contained 25 legal cases for the student to solve. The evaluation took place in August 1999.

During the period September 1999 - December 1999 we extended PROSA with another 25 cases, bringing the total number of cases available at this moment to 50 legal cases. We already designed another 25 cases to be incorporated in PROSA. This will bring the total amount of cases to 75, being 15 cases per topic with 5 cases for the levels of difficulty 'easy', 'medium' and 'difficult'.

We do have to design cases for the difficulty levels 'very easy' and 'very difficult' and incorporate these in PROSA. That will bring the total number of cases in PROSA to 125.

8.3.3.2 Extend the legal sources

The only available legal source in PROSA at the moment is 'statutes'. The next legal source we plan to incorporate is 'precedents'.

8.3.3.3 Extend the support

First of all we want to extend the support related to the construction of the legal solution.
The simplest extension of the support in the construct legal solution window is the presentation of the correct solution. Another extension is to indicate in the feedback that a section is composed of section components, as for instance is the case in section 1:2 subsection 1 of the Gala, the section components being: 'the person', 'an order' and 'interest is directly affected'. We also want that the components, the order of the components and the answer of the student can be compared with the correct legal solution in PROSA in such a way that deviations are depicted. The same is planned for the process. We want to compare the students activities with the recommended route and the two alternative routes is such a way that deviations are depicted. Next to that we need to extend the support in the legal rules window.

As we indicated in Chapter 3 students may benefit from alternative representations of the statutes. Therefore we plan to incorporate more structured representations of the statutes available in PROSA.

8.3.3.4 Other legal domains

Incorporating another domain of practice gives us the opportunity to test the re-usability. In the current domain of practice, administrative law, the main statute is the GALA. The GALA has only a few articles that play a normative role, the GALA is typical 'definitional' law. Therefore we have little experience yet how PROSA may help students with problems of this type of category of knowledge. Incorporating a domain of practice in which statutes are available where articles play a normative role may give us this opportunity.