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Supporting effective learning of legal case solving using a computer program as the instructional environment

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Abstract

The design of computer assisted instruction is characterized as basically being instructional design. The computer program described in this paper is designed to create an instructional environment for the purpose of facilitating the learning of legal case solving. This paper describes the principled design of the instructional program for learning to solve legal cases. The instructional design is based on theoretical assumptions on learning and instruction. The theoretical approach of Gagné (1985) is chosen to define the major principles. The necessary details are contributed by the theoretical approach of Merrill (1983) whose work is based on Gagné. Motivational issues are added using the theoretical framework developed by Keller & Suzuki (1988) whose work is also based on the theoretical approach of Gagné.

Learning and instruction

Instruction is designed to teach a certain subject and/or skill. However, teaching is not an end in itself.

...features of the educational process should be determined by the requirements of getting the students to learn efficiently (Gagné, 1985, p. 23).

Teaching should aim at facilitating learning. To understand the learning processes enables the discovery of the most effective methods of manipulating these learning processes. A theory of learning may answer the question how to arrange instruction to support learning. Instructional design based on a learning theoretical approach makes it possible to arrange instruction in a coherent and consistent way and to account for things that do not work as planned in the instructional design.

Criteria

To be able to select a theoretical basis for the design of the instructional program, criteria were formulated. The theoretical approach should contain at least:

(a) an explicit description of learning.
(b) an explicit description of the relation between learning and instruction.
(c) an explicit description of how to arrange instruction to evoke, enhance and support learning.
(d) an explicit description of the relation between motivational issues and learning.
(e) an explicit description of how to arrange instruction to evoke and sustain motivation.

Gagné (1985) explicitly describes a view on learning, a view on the relation between learning and instruction and a general view on how to arrange instruction for effective and efficient learning. The theoretical approach of Merrill (1983) is selected to prescribe how to arrange instruction on the level of a particular lesson to an individual student. The motivational model of Keller & Suzuki (1988) is selected to incorporate motivational issues in prescriptions for arranging instruction to support learning.

Learning model

According to Gagné learning is largely dependent on events in the environment with which the individual interacts. The change in performance is what leads to the conclusion that learning has occurred.

... there are several varieties of performance types that imply different categories of learned capabilities (Gagné, 1985, p.20).

These varieties of performance may also be differentiated in terms of the conditions of their learning. These conditions under which learning takes place can be observed and described. In searching for and identifying these conditions a distinction is made between the capabilities internal to the learner and the stimulus situation outside the learner. The learning of each type of new capability starts from a different point of prior learning and is likely also to demand a different external situation.

Gagné focuses on the relation between different internal general learning processes and related external events to evoke and support these processes. Gagné (1985) states that to be able to determine what learning is, it is necessary to identify learning outcomes, or learned capabilities, which are varieties of what is learned, events which take place during learning and conditions required for learning a specific capability. Gagné distinguishes five types of learned capabilities: verbal information, intellectual skills, motor skills, attitudes and cognitive strategies. These categories of learned capabilities differ in the human performances they make possible and the internal and external conditions favorable for their learning. The internal conditions see to the cognitive processing required and the presence of required prerequisite knowledge and skills.

Gagné (1985) selects the information processing model of learning and memory. This model postulates a number of internal structures and corresponding processes (attending, storage in short term memory, encoding, storage in long term memory, retrieval, response, performance). The external conditions are the environmental stimuli that support the learners cognitive processing.

When designing instruction both types of conditions should be specified as complete as possible to produce the desired learning outcome. The initial step to take when an instructional plan for learning is made is to reveal the internal conditions applicable to the learning task to be able to arrange the external conditions in such a way that the expected and desired outcome will be achieved.

Instruction may be thought of as the institution and arrangement of the external conditions of learning in ways which will optimally interact with the internal capabilities of the learner so as to bring about a change in these capabilities (Gagné, 1967, p. 295).

Instruction is composed of several different kinds of external stimulation which influence several different internal processes of learning.

Instructional model

Gagné attempts to describe the conditions necessary for the acquisition of each outcome category in terms of traditional learning psychology variables. This approach is extended and refined by the more presentation oriented approach of Merrill (1983). Merrill offers a set of detailed prescriptions that indicate what instructional strategy is most likely to optimize the achievement of the desired outcomes under the specified conditions. Outcomes are specified by the two dimensional performance - content classification scheme. Merrill (1983) differentiates between type of content to learn and type of performance to demonstrate. Each type of objective requires a unique set of conditions to promote optimal acquisition of the capabilities specified by the objective. Given certain conditions related to a certain objective the student will be able to demonstrate certain behavior. The behavior is an indication of the availability of competence defined by the learning objective. Merrill postulates that all instructional presentations consist of a sequence of separate displays or presentation forms.

Every presentation of instruction can be described as a sequence of these presentation forms. Merrill assumes that for each performance - content category there is a combination of primary and secondary presentation forms that will result in a more effective, efficient and appealing acquisition than will any other combination of displays. The primary presentation forms are the major vehicle of instruction. The primary forms present subject matter represented as a combination of a level of specificity of subject matter (general level, particular level) and the responsive expectation for the student. The secondary presentation forms can be characterized as elaborations of the primary presentations forms. Secondary presentation forms support and facilitate the students processing of information.

Relating the performance - content classification scheme of learning outcomes with the different types of primary and secondary presentation forms represents a model of instruction.

Motivational model

Although they both acknowledge that motivation can influence both the quantity and the quality of learning, Gagné and Merrill do not systematically integrate motivation in their models on learning and instruction. Keller & Suzuki (1988) describe a systematic approach for designing motivational aspects to make the instruction appealing, efficient and instructionally effective. The model they developed is called the ARCS model. (1) This model is based on the model of learning and instruction of Gagné (1985). The ARCS model postulates that there are four factors in the motivation to learn. These four factors of the ARCS model are attention (arouse and sustain curiosity and attention), relevance (connect instruction to important needs and motives), confidence (develop confidence in success and generate positive expectancies) and satisfaction (manage reinforcement). The ARCS model includes subcategories of motivational characteristics (issues) and examples of motivational strategies. The ARCS model is used in conjunction with a systematic instructional design process. The issues to consider in relation with the nature of motivation, the conditions that influence it and its influence on learning and performance are:

1. the specification of motivational objectives. What kind or type of motivational effect is desired. Types of motivational effects that are distinguished are a general affective reaction, improved learning performance, increased persistence, more consistent levels of persistence, improved confidence, increase in perceived relevance, the level of excitement, voluntary engagement in the task (continuing motivation).
2. the entry characteristics of the audience analysed on the basis of the ARCS model categories.
3. motivation effects in strategy selection. The motivation to learn is enhanced by features that relate directly to the instructional content and the methods of teaching.

Supporting the learning of legal case solving

In designing instruction for law students to learn legal case solving the main questions are "What is it that you want the students to learn?" and "How to arrange instruction to support this learning?".

Legal case solving can be described as applying (subsections of) laws to a specific situation to find a legal solution. Legal case solving can be characterized as domain specific problem solving. Learning to solve legal cases is learning to solve domain specific problems. The learning outcome to strive for in terms of Gagné is the learning outcome of intellectual skills. Subcategories of intellectual skills are concepts, rules and higher order rules. A higher order rule is a relation between two or more rules, a rule is a relation between two or more concepts.

Learning to solve legal cases depends on the presence of previously learned rules and concepts. A student has learned to solve legal cases when she is capable of identifying legal concepts, classifying legal concepts, combining legal concepts and combing legal rules. To be able to infer that a student has all these capabilities, that is has learned to solve legal cases, it is necessary to ask the student to demonstrate these capabilities.

The classification of the type of capability to be learned makes it possible to specify external events effective for this particular learning outcome. The external events distinguished by Gagné are gaining attention, informing the learner of the objective, stimulating recall of prerequisite skills, presenting the stimulus material, providing learning guidance, eliciting performance, providing feedback, assessing performance, enhancing retention and transfer. Some of the external conditions are common to all learning outcomes, for example, external provisions made to stimulate the attention of the student. Some external conditions are related to what is being learned and differ within the learning outcome expected. The events stimulating recall of prior learning, presenting the stimulus and providing learning guidance are particularly distinct for each type of learning outcome. The internal conditions for legal case solving are that the student must be able to recall the relevant rules that have been previously learned as well as strategies of search to retrieve rules, strategies to differentiate concepts and strategies of matching specific instances as concepts. To solve a (new) problem a student has to use rules. However, to be able to do so the learner needs to know the rules necessary for solving the problem. To be able to learn rules the learner needs to know the concepts, rules being relations between concepts. To be able to learn concepts the learner must know how to discriminate between distinctive characteristics of concepts. Gagné decomposes problem solving and states that for a student to be able to learn how to solve problems all composite aspects should be learned in advance.

External conditions are verbal instructions to stimulate recall of relevant rules and instructions to guide the problem solving process (for instance, by informing the student about the goal of the problem solving process, informing the student about the general form of the solution).

Having classified legal case solving as a specific learning outcome it is possible to select the corresponding model of instruction using the approach of Merrill. The model of instruction for learning legal case solving prescribes as the primary presentation form a set of instances (legal cases). The secondary presentations that should be added to instance practice items (legal cases) are alternative representation forms and feedback.

Keller & Suzuki (1988) state that motivation can influence both the quantity and the quality of learning. Therefor attention should be paid to implementing motivation in the design of instruction for supporting learning.

The instructional program PROSA

The activities for the planning and design of instruction based on a model of learning are applied to the design of an instructional program for supporting the effective learning of legal case solving. These activities imply:

1. analyse the learning task.
2. categorize the task into one of the five categories of learning outcome.
3. identify prerequisites.
4. identify external conditions for learning.
5. arrange the external events (events of instruction).

These activities are supplemented with the activities distinguished by Merrill (1983) being:

1. categorize subject matter content.

2. categorize student performance.
3. select primary presentation forms.
4. select secondary presentation forms.
5. select process displays (optional).
6. select procedural displays (optional).
7. relate the performance - content classification scheme of learning outcomes with the different types of primary and secondary presentation forms.
8. decide on level of richness.
9. decide on amount of learner control.

Both sets of activities are amended using the ARCS model described by Keller & Suzuki (1988).

1. specify motivational objectives.
2. specify entry characteristics of the students using the ARCS model categories attention, relevance, confidence and satisfaction.

The learning outcome has been classified on the basis of an analysis of the learning task. Learning legal case solving is classified as belonging to the category of intellectual skills. The internal and external conditions necessary to acquire this learning outcome offer guidelines for the arrangement of the related instructional events. The instructional model relates the learning outcome to specific primary and secondary presentation forms. Motivational strategies based on the four factor motivational model are added to this instructional model.

Relating the performance - content classification scheme with the different types of primary and secondary presentation forms and applying the consistency and adequacy rules results in an instructional model for learning legal case solving.

For law students to learn how to solve legal cases the instruction takes the form of practicing legal case solving. The performance category is use. The content categories are concept and procedure (rule).

The prescribed primary presentation forms are instance practice items (specific legal cases) in which concepts have to be classified and procedures have to be demonstrated. The secondary presentation forms that should be added are representational elaborations and elaborative feedback in the form of a presentation of the correct answer, the words right or wrong, or a complete reworking of the problem with the student.

PROSA supports the learning of legal case solving using a computer program as the instructional environment. Advantages of the use of a computer program are the opportunities that are offered with regard to interactivity and adaptability.

The primary presentation level in PROSA presents the stimulus materials being the problem situation (legal case) and the laws (the tools for legal problem solving). At this presentation level the student has to demonstrate her legal case solving capability by constructing a legal solution using the legal case and the laws.

The primary presentation level is subdivided into three separate parts. Each part contains an essential aspect of legal case solving. There is the part where the generality is presented (laws and subsection of laws), the part where the instances are presented (the problem situations or legal cases) and the part in which the student has to construct the legal solution.

The secondary presentation level presents the elaborations (examples, prerequisites, help, feedback, alternate representations).

The secondary presentation level is subdivided into three separate parts. Each part contains elaborations on the primary presentation forms part it belongs to. There is a part that presents elaborations on the laws, there is a part that presents elaborations on the instances (legal case), and there is a part that presents elaborations on the legal solution.

The analysis of the legal case solving task results in a model of legal case solving to be used as a template

for the legal solution to be constructed by the student at the primary presentation level, as the general model for assessing the students solution and as the model to use in the elaborations at the secondary presentation level.

The analysis of the specific content domain results in a list of the domain specific topics. This list is the ordered set of concepts the student needs to learn in order to achieve an understanding of the topic to be acquired. The concepts belonging to a topic in the topic list are specified to reveal their attributes and values. Legal cases are constructed on the basis of the topics and the specified concepts. The topics combined with the ordered set of related legal cases as instances for demonstrating the necessary capabilities to be able to infer that learning has occurred results in the Topic Problem situation model (TP model) used for selecting a specific case to be presented to a particular student at the primary presentation level. The TP model and the more elaborate list of concepts are also used for support purposes at the secondary presentation level.

Interaction in PROSA

A session with PROSA starts with selecting a legal case from the TP model. A case can be selected by the system or by the student. Cases are arranged in the TP model on the basis of their topic. Within each topic cases are arranged from easy to hard.

The selected case is presented at the primary presentation level in the case part of the screen. The student has to construct the legal solution at the primary presentation level in the solution part of the screen. The goal of the problem solving process is stated as a question in the solution part of the screen at the primary presentation level. The construction of a solution starts with selecting facts from the specific legal case and selecting corresponding laws and subsections of laws. Laws are selected in the laws part of the screen at the primary presentation level.

The primary presentation level is the level where the student is invited to demonstrate her legal case solving capability. The secondary presentation level is the level where elaborations that correspond to the activities required at the primary level are presented. Elaborations that are relevant for supporting the learning of legal case solving are alternative representations, prerequisites and feedback. The student is offered tailored support in the process of solving a legal case. Support is available for all three parts distinguished at the primary presentation level. The basis for the elaborations related to the legal case part is the list of specified domain concepts. The basis for the elaborations related to the legal solution part is the legal case solving model. The basis for the elaborations related to the laws part are alternate representations of laws to support the search and selection process.

Figure 1: interface PROSA

The program Authorware is used for implementing the specification of the design of the instructional program. Authorware is an authoring environment for creating and publishing interactive information and can be used for the construction of interactive learning and training applications. Authorware has many evaluation functjens that make it possible to handle all kinds of input. Authorware makes it possible to incorporate digital movies, sound, animation, graphics and text in the application to be constructed.

The legal application PROSA is heavily text based. In the process of constructing the application for supporting the learning of legal case solving it became clear that using text in a computer program is a problem. It is not necessarily an Authorware problem, but a more general problem in using computer programs for instruction in almost solely text based domains. The tools available in Authorware to create and

implement digital movies, pictures and graphics are not used in this particular application, because there is no function for them in the application for supporting the learning of legal case solving.

Conclusions

The design of an instructional program for supporting the learning of legal case solving is based on theoretical assumptions about learning and instruction.

Such a principled design results in a coherent and consistent instructional program. The choices made in the design process are accounted for and are not intuitive or ad hoc.

PROSA is designed to learn to solve legal cases in the domain of administrative procedural law. However, the way in which the instructional program is designed makes it possible to use it for other legal domains as well. An analysis of the specific legal domain should be carried out to result in the domain specific TP model and a list of specified domain concepts. The specific laws should be incorporated as well.

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Notes

(1) ARCS stands for Attention, Relevance, Confidence, Satisfaction.

(2) PROSA stands for Problem Situations in Administrative law.

(3) Authorware 4 copyright @ 1997 Macromedia, Inc. San Fransisco, California, USA. Financial support by the Ministry of Education and Science made it possible to appoint a programmer. Jolanda Groothuismink is the programmer sint eh PROSA project.

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