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Capturing Learning Attitudes through Presentation Design Activities

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Abstract: This paper describes a unique learning system that cultivates a positive attitude toward learning through presentation design activities. Learners are assigned two tasks: a declarative knowledge task, and a presentation task that involves selecting slides to create a presentation from among a set of slides that is provided. The slides have been prepared so that some of the slides are relevant and support the theme of the presentation while others are redundant or may even contain wrong information. A learner model is presented that captures the attitudes of subjects toward learning as they perform these tasks.

Keywords: Meta-Cognition, Presentation Design, Learner Attitudes, Learner Modeling

1. Introduction

Our previous study described an approach in which learners are given the task of preparing presentation materials about a particular topic that they have already understood (Seta and Ikeda 2011). We found that by providing a stimulation from the system that prompts learners to reflect back on own learning processes and to acquire domain-specific learning strategies, they achieved (i) tightening of criteria for evaluating own learning processes, (ii) a collaborative meta-learning communications as a way of focusing not on the discussion on attractive appearance of presentation but on ideal learning processes, and (iii) livelier reading between the lines activity touching on things not explicitly mentioned in textbooks.

The learning objective set in this study through presentation design activity is to be aware of the importance of deep understanding, and not mere shallow understanding of a topic in order to produce superior presentations. To achieve this objective, we have developed a learner model to capture their learning attitudes based on which learning-support system prompts learners' awareness on their own learning attitudes by enhancing reflection upon learning activities in pursuing presentation design activity.

2. Meta-learning Scheme through Presentation: Slide Selection Approach

Here we basically adopt the meta-learning scheme proposed by Seta et al.. A major difference between the previous study and the approach we adopt here is that, when learners deal with the task of compiling presentation materials, the instructor has pre-edited the slides and loaded them in the system in advance. In other words, the presentation design task does not require the subjects to actually produce the slides, but merely to select from among slides that have been previously prepared, and put them in proper sequence. Learners are faced with three subtasks as they work through the slide design task:

(2-1) Learners monitor and reveal their own knowledge of the topic described in each slide offered by the system and declare their own knowledge state by selecting from the following three categories: "understand," "do not understand," and "slide is wrong."

(2-2) Learners formulate a learning plan, and organize their presentations as they proceed with the task by selecting (or not selecting) the offered slides and putting them into order.

(2-3) Learners receive guidance messages provided by the system and reflect upon their learning.

Note that slides loaded into the system include not only slides with correct information, but also slides that are plain wrong and slides lacking any important content for learning about the target domain. Moreover, theoretical back ground of the approach is The Knowledge Monitoring Assessment (KMA), developed by Tobias and Everson, is a well-known instrument for assessing metacognitive monitoring capabilities (Tobias and Everson, 2000). The KMA has students perform two types of problems.

(1) A question is presented, and the learners have to declare whether they can answer correctly or incorrectly.
(2) Candidate answers are presented, and learners choose the appropriate answer.

Type (1) is a comprehension monitoring task, while type (2) is a problem-solving task. Monitoring capability is then measured based on the degree of agreement between the results of types (1) and (2) tasks.

In analyzing the characteristics of learners based on these results, it is apparent that students showing high agreement between the two types of tasks also tend to make a sustained effort to learn, while those exhibiting low agreement between the tasks tend to be lazier with respect to learning and figure higher in the drop-out rate.

3. Meta-Model to Construct Learner Models

Here, let us consider the meta-model that forms the foundation for this individual learner model. Table 1 shows a portion of a model capable of inferring metacognitive activity based on declarative knowledge monitoring and slide selection results.

Because the declarative knowledge monitoring and slide selection results reveal the state of a learner's knowledge at two different sequential points in time—that is, before and after the presentation design—this reveals whether a learner with insufficient or mistaken knowledge at the beginning before starting the presentation design project has reconstructed own knowledge through the presentation design task.

Based on this model, we can distinguish four basic types of learners in terms of metacognitive control during the presentation design process using the results of the declarative knowledge monitoring and slide selection:

MC Learners: Learners who recognizes through declarative knowledge monitoring tasks or presentation planning activities that "their knowledge is lacking, and correct their understanding by relearning." Learner types (2), (3), (10), and (11) fall into this category, that represents diligent learners who are really serious about learning.

NonMC Learners: Learners who recognizes through declarative knowledge monitoring tasks that their knowledge is mistaken or lacking, yet do not address the lack of knowledge in the presentation design activities, and do not make any effort to relearn. Learner types (5) and (8) fit into this category that represents lazy or indolent learners.

NonExpLStG Learners: Learners who, even after explaining the topic to another person, this does not trigger awareness that their own knowledge is wrong and they do not pursue relearning. Learner types (6) and (7) fall into this category.

NonReflective Learners: Learners who correctly understand learning items, yet have never considered the significance or placed the learning items in the target domain. Type (4) learners fall into this category. These are learners with only modest understanding of how to acquire transferable learning strategies.

Reflecting on these different types of learners, we should be able to generate appropriate advice tailored to each type. We will discuss this matter in another paper.

4. Conclusions

Table 1: Meta-model to Infer Learners' Meta-cognitive Activities through Presentation Design Activities

Slide attribute		Declarative Knowledge	Selection Results	Semantic interpretation of declarative results	Semantic interpretation of selection results	Semantic interpretation of metacognitive control	
Desirable	Correct content	Understand	Select	M_(A) / B_(A)	M: Probably aware of importance	(1)	—
		Do not understand		M_(B) / B_(B)		(2)	Based on recognition understanding is lacking, probably correct understanding by relearning.
		Wrong		M_(C) / B_(C)		(3)	Recognized own misunderstanding through presentation design activities, probably correct understanding by relearning.
		Understand	Do not select	M_(A) / B_(A)	M: Lack awareness of importance	(4)	Probably no performing of thinking activity on the importance of a learning topic.
		Do not understand		M_(B) / B_(B)		(5)	Recognized understanding is lacking, but probably understanding not corrected by relearning.
		Wrong		M_(C) / B_(C)		(6)	Not aware of own misunderstanding through presentation design activities, and probably no relearning.
Undesirable	Wrong content	Understand	Select	M_(C) / B_(C)	B: Domain knowledge is wrong	(7)	Not aware of own misunderstanding through presentation design activities, and probably no relearning.
		Do not understand		M_(B) / B_(B)		(8)	Recognized understanding is lacking, but probably performed no relearning.
		Wrong		M_(A) / B_(D)		(9)	Probably no appropriate efforts during declarative knowledge monitoring.
		Understand	Do not select	M_(C) / B_(C)	B: Probably understand correctly	(10)	Recognized own misunderstanding through presentation design activities, probably correct by relearning.
		Do not understand		M_(B) / B_(D)		(11)	Relearning based on awareness of misunderstanding, and it probably corrected.
		Wrong		M_(A) / B_(C)		(12)	—

B_(A): Likely that he understands correctly.
B_(B): Likely that he does not understand correctly.
B_(C): Domain knowledge is wrong.

M_(A): Learner thinks he understands.
M_(B): Learner thinks he does not understand.
M_(C): Learner does not recognize he is wrong.

Here we have described a learner model that captures learner attitudes based on presentation design activities. Through a declarative knowledge monitoring task we are thus able to partially detect the disparity between the state of the learner's knowledge and the state of the learner's belief, while also capturing the transformation that can be observed through presentation planning activities. In this study we have come up with a novel approach for inferring metacognitive activity of learners by focusing on the transformation of this disparity, then leveraging that information to capture the attitude of subjects toward learning. Building on this approach, we have already developed a scheme for generating advice and guidance based on the learner model described in the paper.

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