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Design of a Presentation-Based Meta-Learning Environment by Choosing from a Set of Slides

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Abstract: As described in this paper, we propose a slide-selection approach to overcome the problem of realizing a learning environment in which learners can construct presentations by choosing prepared slides. The advantage of this approach from the viewpoint of generating content-dependent guidance messages is that the system can extract the contents of each slide by adding tags that have meanings specified by an ontology, which contributes to enhancement of ontology-based intelligent meta-learning support.

Keywords: Meta-cognition, presentation, slide-selection, guidance generation

1. Introduction

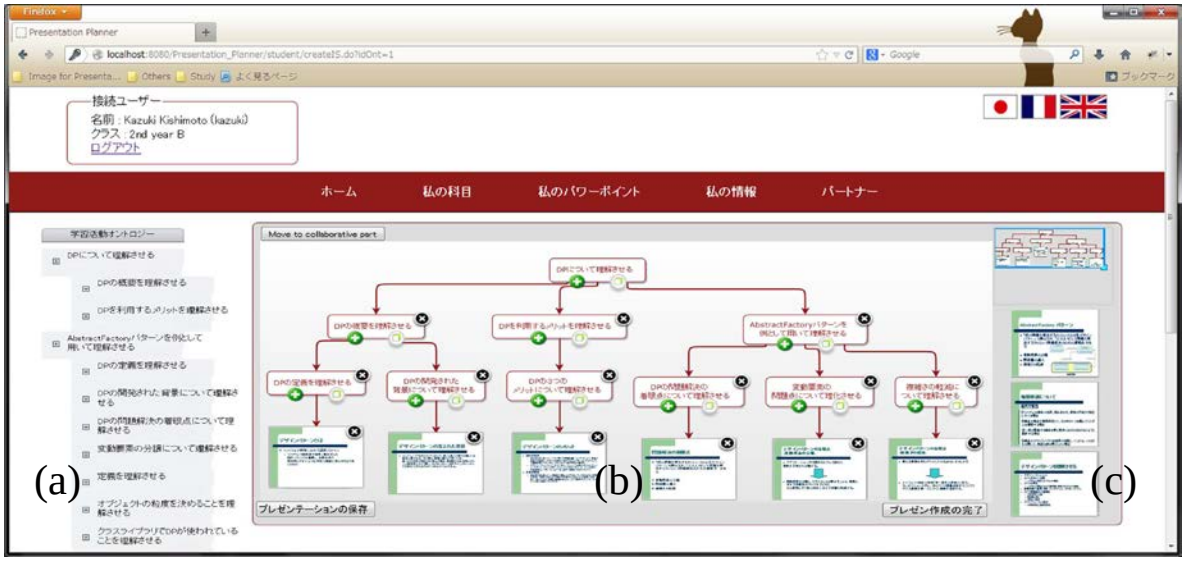
Our previous work, presentation-based meta-learning support system, realized a guidance function that provides meta-cognitively aware instruction that compels learners to *think between the lines* (Noguchi, Seta, and Ikeda, 2011; Seta and Ikeda, 2012). This function is based on knowledge of the educational psychology field. Results of experimental results of studies suggest that the system can facilitate learners' meta-learning processes: it tightens their criteria to evaluate their learning processes and learning outcomes. Results show that participants using the system achieved higher average scores than those not using our system. Nevertheless, some learners who were unable to perform learning processes by themselves were re-organized according to their own awareness of ignorance. As described herein, we propose a slide selection approach to overcome this problem: we can realize a learning environment in which they can construct their presentations by choosing prepared slides. This approach is beneficial because it generates content-dependent guidance by which the system can understand the contents of each slide by adding tags for which the meanings are specified by ontology, thereby contributing to enhancing ontology-based intelligent meta-learning support.

2. System Overview

Figure 1 depicts the interface of our system for the slide selection mode. It includes three panes: (a) at left is a 'teaching activity pane' that shows hierarchy of terms representing teaching activity; (b) at center is a 'presentation structure design pane' that shows an intention structure representing presentation scenario; and (c) at right is a 'slide selection pane' that presents a set of slides that learners can use for their presentation.

In Fig. 1(a), teaching activities such as 'Make learners understand why the Design Pattern was produced', 'Make learners understand the significance of building DP', and so on are provided to make a presentation scenario in Fig. 1(b). In Fig. 1(b), learners clarify their intention of presentation with a hierarchical structure using terms presented in Fig. 1(a).

Our learning system provides users a representation to describe their intention of the presentation (intention structure), the associated intention structures, and guidance function enhance their awareness. Giving appropriate instructions according to learners' learning contexts is important to facilitate their learning skill acquisition. In the intended structure (Fig. 1(b)), each node represents an educational goal. Educational goals that are mutually connected vertically represent that the learner intends to achieve the upper goals by performing lower ones, e.g., the learning goal of 'Make the



learner understand the importance of building DP' is detailed with the sub-learning goal of 'Make the learner understand viewpoints of software design' and 'Make the learner understand the importance of each DP having its own name'. These terms are provided from the system in Fig. 1(a) to represent the learners' educational goals.

Finally, they choose a slide from the slides in Fig. 1(c) that contribute to achieving each goal set at the leaf of the hierarchy.

A notable feature of the slide selection mode is that the system can understand the contents of each slide because teacher pre-constructed tags can be added to represent learning topics of each presentation slide. Consequently, the system can provide content-oriented guidance information.

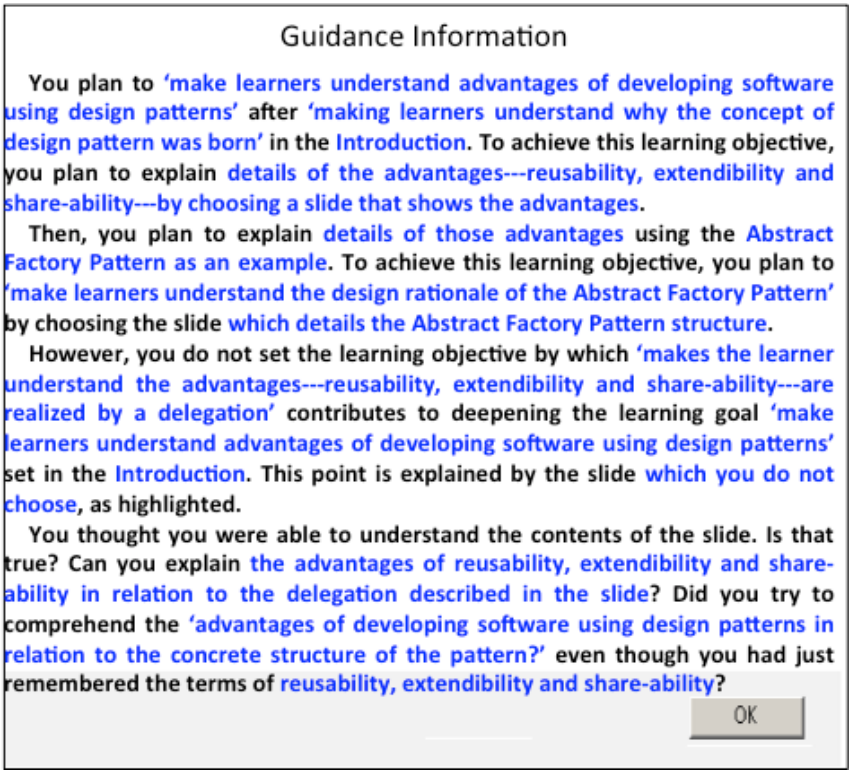
3. Guidance Function Enhancing Reflective Meta-Learning

Learners must reflect on their own learning experiences, using them as learning materials, to acquire learning skills. Figure 2 presents an example of a guidance message designed to enhance these reflective activities: we aim to embed a guidance function into our system that gives at least the following types of messages. In the figure, black parts represent prepared templates. Blue content-dependent information appears according to their intention structure and selected slides.

- Makes them aware of their own understanding state.
- Makes them aware that explanations to others contribute to deepening of their own understanding.
- Makes them aware of the validity of learning objectives and methods.

More concretely, we aim to provide the following messages corresponding to items listed above.

- 'You answered that you did not understand the Slide No. 7 contents before designing the presentation. However, you embedded it into your presentation. What was your intention of doing that?'
- 'Slide No. 10, which you do not choose exemplifies the advantages of the Slide No. 7 embedded into the introduction part. Embedding it (Slide No. 10) contributes to enhancing self-completeness of your presentation and deepening learners' (audiences') understanding, although you answered that you do not understand the Slide No. 10 contents. By addressing the relations among these slides (No. 7 and No. 10), you can deepen audiences' understanding with the connection between the theory and implementation. Why do not you learn about it to embed it into your presentation?'
- 'In the intended structure, you declared the learning goal of 'make the learner understand why UML was born'. Regarding Slide No. 4, however, Slide 17 seems more suitable to achieve the goal. Consider which is more suitable to achieve the learning goal.'



By providing guidance messages like these to learners, we intend to enhance their meta-learning by reflecting on their own learning processes, or by learning again according to the message. The advantage of the slide-choice approach from the viewpoint of generating content-dependent guidance messages is that the system can understand the contents of each slide by adding tags with meanings specified by ontology, which contributes to enhancement of ontology-based intelligent support.

4. Conclusions

This paper presents a discussion of the design of our presentation-based meta-learning environment in which learners build their presentations by choosing a prepared set of slides: guidance functions to enhance their reflective meta-learning are embedded. We've already completed implementation of the interface using JavaScript. We are currently striving for implementation of the guidance generation engine based on the ontology that cooperatively works with knowledge representation of contents of a set of slides (Heath and Bizer, 2011).

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