CREATIVITY SUPPORT THROUGH A KNOWLEDGE HANDLING MODEL

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ABSTRACT

Creativity is a crucial and indispensable power for technological development. To support creativity with computers, we established a knowledge handling model and analyzed the knowledge handling procedures. According to our analysis, domain-specific knowledge base for knowledge acquisition, visualized environment for knowledge refinement, domain-specific creativity support tools for knowledge reproduction and multimedia supports for knowledge presentation will be comprehensively applicable to creativity supports. In our study, we plan to begin from investigating the optimal cognition load and information carriers' allocation in slide presentation. The efficient allocation of cognition load in slide presentation will be useful not only for knowledge presentation, but also be helpful for audiences to acquire knowledge through listening to the presentation.

1. INTRODUCTION

Creativity is a crucial power for technological development. It is also an indispensable part in the knowledge handling procedure. In our previous study [1], we have revealed that there are four functions indicating the knowledge transitions among different knowledge states. These functions are: *Acquisition, Refinement, Reproduction,* and *Presentation*. The three knowledge states are *Inside* of the *In-world* (indicating the cerebrum of human beings), *Outside* of the *In-world* (indicating the interaction media through which the knowledge objects can be directly manipulated by the individuals) and *Out-world* (indicating the external world that cannot be manipulated directly by the individuals). Figure 1 illustrates the functions and states for knowledge handling procedure. Our main concern is to support the creativity through computer assistance in different functions of knowledge handling procedures. Therefore, in this paper, in Section 2, we introduce some supportive plans as our future research for the creativity supports based on the knowledge handling model analysis. Then, in Section 3, we will propose our study plan on optimal allocation of cognition and vision load in slide presentation.

2. COMPUTER SUPPORT FOR CREATIVITY

Through our analysis of the knowledge handling procedures, we regard that the cerebrum activities happens in *Inside* of the *In-world* are impalpable for computer supports. Meanwhile, since our main concern is to support the individual creativity though computer tools, we have no intention to change the *Out-world*. Therefore, we concentrate on affording supports in the *Outside* of *In-world*, which, in other words, is the interface between humans and the knowledge handling tools.

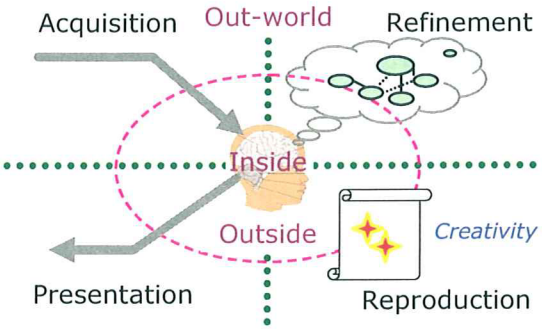

Figure 1. Four functions and three states in knowledge handling

The major task in creation can only be accomplished by human. Therefore, our purpose is not to develop systems to replace the human's creativity characteristics, but to clear away the obstacles on the way towards creativity and afford the most creativity hospitable environment for human beings. Thus, for *Acquisition*, as indicated by Figure 2, a domain-specific knowledge base which is accessible for users without great effort costs is necessary to afford a wide range of information for creativity.

Then, a friendly interactive space for the users to refine his or her thinking and find more related hints is helpful for creativity. For example, to visualize the thinking procedure in a two dimensional interactive space helps the user to have a clear and convenient cognition and management about his or her knowledge processing.

The creativity happens in *Reproduction*, but the realization of this function mainly depends on the preparation in *Acquisition* and *Refinement* functions. We can only design

computer supportive tools according to the characteristics of different domain.

To realize *Presentation* function, thanks to the software technology development, there have been a lot of applications which help us to disseminate our knowledge outwards through multimedia software, such as Microsoft Word and Latex's support for writing paper, PowerPoint and Acrobat's support for giving oral presentation, etc.

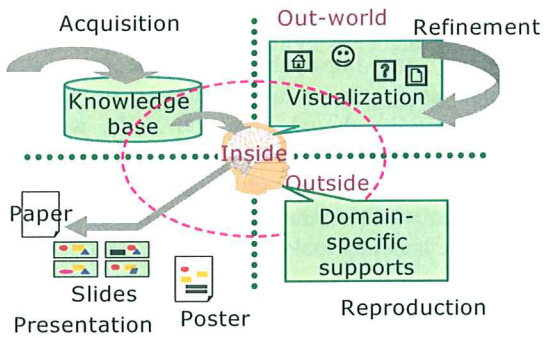

Figure 2. Supports for creativity in knowledge handling model

3. SUPPORT IN KNOWLEDGE PRESENTATION

As we introduced above, using PowerPoint to make up slides is a widely applied and convenient way to present knowledge to the Out-world. Therefore, in our study, we are going to investigate the optimal allocation of different information carriers in slide presentation for the audience to acquire knowledge with minimum cognitive efforts. Here we use cognition load to refer to the level of effort associated with thinking and reasoning (including perception, memory, language, etc.) required by a certain cognition task. Then, we can give a guide on how to design an optimal cognition load scheme in slide presentation. Here the optimal cognition load is defined as the cognition load that costs the least efforts while guarantee the fulfillment of the cognition task.

To realize our purpose, first we have to investigate the cognition load required by different information carriers in a slide, such as explanation words, pictures, tables and formulations (see some examples in Figure 3). Different information carriers require different cognition load. For figures, we need to consider the contents (such as explanation images, histograms, regression lines, charts, photos, illuminations, cartoons, etc.), sizes and positions. For tables, we also need to consider the contents (numeric or literal), size and positions. For formulations, we need to consider the numbers of parameters and mathematic symbols to decide the cognition load.

Once we master the optimal cognition load and allocation for one piece of slide, we can allocate the whole contents that one plans to show through a certain length of presentation. For instance, we need to answer the questions about how many pieces of slides are perfect for a presentation in a strictly limited time period and how to allocate the contents of the presentation throughout the slides for a specific group of audiences. Superfluous or deficient information is inappropriate for either the presenters or the audiences who are ready to acquire information or knowledge from a presentation. Therefore, the detailed research on seeking the optimal allocation of contents in slides to reach the cognition and vision efficiency of audiences is important for knowledge presentation and acquisition.

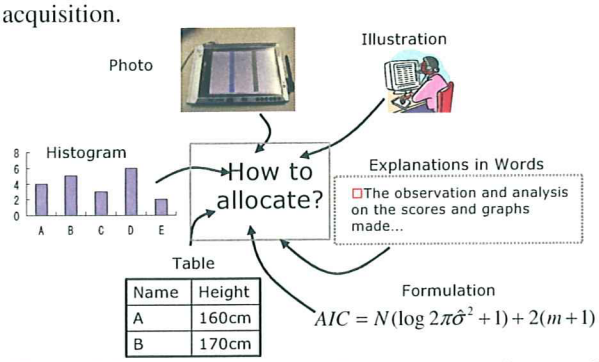

Figure 3. Examples of some information carriers used in slide

Moreover, we also need to consider some psychological and physiological effects of the audiences upon knowledge acquisition from slide presentation. For example, we need to consider when the audience may feel tired during a presentation, and when the audiences may get refreshed.

4. CONCLUSION

To achieve the supports for activity through the analysis of knowledge handling model, we break down the knowledge handling procedure into four functions. According to different functions and its knowledge transition activity media (Inside, Outside or Out-world), we try to figure out what kind of computer supports are useful for creativity. Our future work will first be concentrated in the investigation of optimal cognition load in slide contents allocation for better knowledge presentation.

5. REFERENCES

[1] T. Watanabe, A Knowledge Handling Model to Design Learning Activity, Proc. of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (E-Learn2005), pp. 1566-1571, October 24-28, 2005.