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Technology Enhanced Self-Monitoring for Warm-up before Class

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Abstract: Most teachers and students are convinced of the preparing lessons before class is important and effective to engage in classroom activities, but the unknown state of preparation usually discourages both teachers and students to sustain this good learning strategy. From literature survey, JiTT and WIRE model provided effective warm-up strategies but also found some challenges in implementation. This work-in-progress research applied self-explanation theory and reading comprehension strategies to design a lesson warm-up mechanism. A correspondent supporting system was constructed to implement the mechanism to improve the effect of warm-up. This study is currently being experimented using quasi-experiment method for computer science students. Both quantitative and qualitative data will be collected, analyzed, and shared in the future.

Keywords: Self-explanation, Reading comprehension, self-monitoring, WIRE learning model, Just-in-Time Teaching

Introduction

Preparing lessons before class is generally acknowledged as an effective method that can enhance motivation of classroom activities and learning outcome. Most teachers and students are convinced of the preparing lessons before class is important and effective to engage in classroom activities, but the unknown state of preparation usually discourage both teachers and students to sustain this good learning strategy. Most teachers feel hard to know what students have known and unknown and what problems are confronted, and most students feel hard to be conscious of what they are reading in learning materials and what prerequisite knowledge they need to review to learn the new lessons.

Just-in-Time Teaching (JiTT) [3] was proposed to collect learners' preliminary understanding of the new lesson from the review of their individual submissions of web-based preparatory assignments, and then to adjust and organize the classroom lessons. However, some challenges were found in literature. First, the teachers have a big challenge to review all submissions of warm-up assignments and prepare teaching content in only two hours. Besides, after classroom activities the instructors need to prepare short quiz for the next lesson in a short time [4, 5, 6]. Second, the students usually are speculated to read materials only for solving the warm-up quiz, so that they may "choose to simply skim the selection to find the detail that answers the multiple choice questions and provide a minimal response to the short-answer question [5]." Shallow warm-up will contribute small effect for classroom learning. Last, it is a non-easy skill for teachers to write an appropriate quiz that can "generate significant thought without discouraging students from even addressing the questions [4]."

Based on JiTT, Juang [1] proposed a highly interactive learning model, WIRE, for blended learning, which integrates *Warm-up* before class, *Interaction* in class, and *Review* and

Exercise after class into a coherent learning experience. In the case study [2], the warm-up strategy of WIRE model changes questioner from teacher to student, that is the students are demanded to ask at least three questions in warm-up. Although the results represented significant improvement on teacher's heavy burden and the difficulty of asking good questions, students' shallow warm-up still exists. Since the students can easily post any questions for the preparatory assignment, they may not really read the whole material or just pick up some ideas and post shallow questions to make perfunctory attempts.

This work-in-progress research applied self-explanation theory [7-9] and reading comprehension strategies [10, 11] to design a lesson warm-up mechanism that students can self-monitor their comprehension, self-explain what they read and questioning what they do not understand in learning materials. A correspondent supporting system was constructed to implement the mechanism for facilitating students' awareness on metacognition of learning management, so that we hope the effect of warm-up, learning motivation, and interaction between teacher and students can be improved.

1. Warm-up Strategy Design

The basic idea of self-explanation theory, which emphasizes on the restatement or explanation of learning material, attempts to help individual knowledge construction [7]. By self-explaining personal understanding about the reading texts under a natural process or someone's prompt, the learners can construct better mental model [10]. Through the discipline of self-explanation, the high-order thinking of learners also can be raised to bridge both old and new knowledge [8]. McNamara [8] introduced a serial reading strategy to provide students a self-explanation method including comprehension monitoring, paraphrasing, bridging inference, elaboration, using logic, and prediction. Through the process, students' reading skill were improved through self-explaining and review their understanding of the materials. However, when is the best timing for using self-explanation? Chi & Vanlehn [9] suggested by reading examples students can generate more distinct pieces of constituent knowledge from self-explanation. The process can also generate new general knowledge to complement incomplete principle and concept of the domain knowledge.

In reading comprehension strategy, Robinson [10] introduced a study method SQ3R, which indicates the survey, questioning, reading, reciting, and review, to raise reading comprehension. The previous three strategies are the important components for the warm-up that can be used in our work. Besides, Blachowicz and Ogle [11] also used self-monitoring concept to propose some similar reading strategies that used prior, in, and after reading process. The preview, prediction, questioning, checking understanding, monitoring understanding, and summarizing are helpful strategies for warm-up practices.

By applying the self-explanation theory and reading comprehension strategy, this work-in-progress research attempts to design a warm-up strategy that can improve students' learning attitude, motivation, and learning effect to get ready for classroom activities. The process, which comprises four stages with teacher's guiding messages and warm-up questions, is detailed as below.

- *Overview*. The students are asked to write abstract within 100-150 words to give an overview description and to predict the major concept of the material after reading the text outline or introduction.
- *Review prior knowledge*. The teacher prompts the past concepts related to the new material, even provides related learning resources, for students reviewing prior knowledge and then rating the level of recalling to mind from five levels.
- *Reading and comprehension monitoring*. The students read either the digital or printed

material. After reading, they are asked to write a short brief within 200-300 words of the their self-explanation or ask questions, and then rating the level of comprehension from five levels.

- *Summary*. The students are asked to answer a quiz that comprises 3-5 warm-up multiple-choice questions provided by teachers for the summary and evaluation of their preliminary understanding of the material. In order to comprehensively evaluate the state of warm-up, the students are asked to answer a last question about their estimation of time on the warm-up assignment.

2. System Design

All activities of the above stages will be conducted on the web for efficient interaction before classroom activities. Although teachers can adopt any conventional course management system, such as Blackboard, a specially designed system will be an appropriate solution to completely fit in the requirement. Thus, the authors have designed a web-based warm-up procedure according to the above strategy into their previous system, BBLS (Blog-Based Learning System). The warm-up is launched by the teacher's notice that comprises title of lesson, pages in text, learning resources of prior knowledge, warm-up quiz, and due date. Then, students will see the notice and click to open the following four webpages for filling up overview, self-explanation, and questions, rating the level of comprehension, quiz, and estimation of time on warm-up. Besides, all posted messages and uploaded documents in the warm-up procedure will be reorganized into personal blogs as learning records for further review and discussion.

3. Future Study

The proposed warm-up strategy is currently being experimented using quasi-experiment method for computer science students. Both quantitative and qualitative data will be collected, analyzed, and shared in the future.

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