Reflection Wrapper Activities to Promote Pre-Service Teachers' Metacognitive Strategies

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Abstract

This paper investigates the impact of reflection wrapper activities to improve pre-service teachers' metacognitive strategies in the higher education classroom. It reviews relevant literature describing what reflection wrappers are, how to use these activities, and their significance to enhance pre-service teachers' metacognitive strategies, such as planning, monitoring, and evaluating.

Introduction

Prior research suggests that when students are shown how to self-regulate their study behavior and knowledge, it could have long-lasting positive effects on their learning (Gezer-Templeton, Mayhew, Korte, & Schmidt, 2017; Lovett, 2013). These skills can be developed gradually during class time by teaching alternative study strategies or outside the classroom by giving students assignments to practice these skills. For example, metacognitive strategies that teachers want to promote in education can be embedded easily by employing a tool known as an exam wrapper. One of the desired outcomes of exam wrappers is enabling students to self-evaluate and make plans for improved future study strategies. Lovett (2008) developed the exam wrapper concept, while exam wrappers were first introduced as a tool in a posttest analysis by Achacoso (2004). The reflective post-exam questionnaire has since formed the backbone of the exam wrappers that are used today.

Reflection Wrappers

The reflection wrapper includes diagnostic questions that facilitate student self-assessment and understanding of lessons, help with exam preparation, and promote metacognitive skills. These tools have gained in popularity by prompting students to reflect on three major components of learning: exam preparation (thinking about study skills used), types of errors made in study or on exams, and adjustments for future learning (modifications to study habits to better prepare for the next class or exam). Reflective wrappers include exam wrappers and reflective thinking activities.

Exam Wrappers

Exam wrappers are short questionnaires administered around the end of a lecture, assignment, or assessment to train the student to think through the steps of metacognition, i.e., planning, monitoring, adapting, and evaluating (Root Kustritz & Clarkson, 2017). Lovett (2013) described exam wrappers (or cognitive wrappers) as concise, straight-forward activities that urge students to assess their performance (and the instructor's feedback) on an exam with directions for the future in mind. Gezer-Templeton et al. (2017) described them as brief, reflective writing activities that ask students to evaluate their applied study approaches to their performance on an exam while concentrating on modifying future learning practices. For example, students can fill out exam wrappers after they take a performance exam. Such wrappers include short questions asking about their exam preparation, what the most difficult questions were, and what they might do differently before the next performance exam. Unfortunately, there are few published studies on the use of exam wrappers as a strategy in a blended learning environment (e.g., a flipped classroom) to improve metacognition.

Reflective Thinking Activities

In addition to exam wrappers, reflective wrappers also include reflective thinking activities that encourage students to engage in active learning through problem-based tasks to develop higher-order thinking skills while thinking about their thinking. For instance, the instructional design of the flipped classroom tends to have activities, such as pre-class asynchronous metacognitive activities, and to record lectures out of class time. This affords more opportunities to engage students with questions about the content and discuss difficult concepts or topics in active learning. Thus, students are empowered to explore and solve problems in groups to achieve their learning goals before class. Students are expected to demonstrate an understanding of the task and topic by problem solving on a discussion board before class to build their basic knowledge of the content and discuss complex tasks with friends or the instructor outside the classroom (such as online) through a pre-class asynchronous metacognitive activity or inside the classroom (via face-to-face learning).

Significance of Wrappers

Exam wrappers include three basic types of questions:
1. "How did you prepare for the exam?
2. What kinds of errors did you make on the exam?
3. What could you do differently next time?" (Lovett, 2013, p. 23)

Responding to the exam wrapper helps students develop self-regulated learning (SRL) skills (Gezer-Templeton et al., 2017; Lovett, 2013) and metacognitive strategies (Lovett, 2013). SRL involves learning certain skills, such as self-assessment, goal setting, goal implementation, and monitoring progress (Zimmerman, 2002). Wrappers do not take up much class time, require minimal time from the student, are easy to adapt across different courses, and address several components of metacognition (e.g., performance evaluation, assessment of strengths and weaknesses, behavioral adjustment, and strategy identification).

The exam wrapper helps students learn more from test results and improve their performance on future tests (Lovette, 2013). It has thus come to be seen as an effective and valued post-exam reflection tool for promoting self-study habits (Gezer-Templeton et al., 2017). It also assists teachers in suggesting learning strategies and providing encouragement (Butzler, 2016). Furthermore, exam wrappers have allowed students to reach their own conclusions about the learning process (Lovett, 2013), and they are an effective tool for helping learners use their developing metacognitive strategies (Butzler, 2016; Lovett, 2013; Soicher & Gurung, 2017).

Based on sound pedagogical and theoretical principles, the reflective wrapper aims to foster metacognitive skills by training students to recognize what information they accurately understand, so they can devote more effort and time to information they do not understand (Root Kustritz & Clarkson, 2017; Lovett, 2013). Reflective wrappers could therefore help independent lifelong learners continuously assess the outcomes of their actions to build new knowledge.

The literature has reached a common understanding of what wrapper activities are. However, there is still a pressing need to understand how and when instructors can implement reflective wrappers and connect these activities to an environment with a mechanism for training metacognitive skills while meeting the criteria for applying exam wrappers (e.g., short questions, repeated use, use immediately after students receive their graded activity or performance exam). It is also important to connect reflective wrappers to evidence of advantages to different aspects of student study habits.

Implementing Exam Wrappers

It is easy to implement exam wrappers due to several factors (Butzler, 2016; Lovett, 2013). First, they are short (1-2 pages), often containing only short-answer questions. Second, they do not require much student time to complete or teacher time to assess. Third, teachers can easily adapt the exam wrapper for different majors and any learning task. For example, Lovett (2008) asserted that exam wrappers could be used for assessing lectures, homework, quizzes, and discussion. Fourth, exam wrappers are repeatable tools for subsequent quizzes, with some changes to avoid repetition. Fifth, this reflection helps students evaluate their performance, assess their weaknesses and strengths, identify the best strategies that work for them, and make appropriate adjustments. The metacognitive strategies students practice by using exam wrappers in a course provide substantial benefits, and teachers can encourage students to apply these strategies to other tasks and classes (Lovett, 2013). In higher education, beyond checking their grades, students typically choose to put the test out of their mind and proceed on to the next task.

Nonetheless, it is imperative for educators to carefully explain the reasons behind students' performance on a given test (Lovett, 2013).

Lovett (2013) explained the primary method of using exam wrappers. Students prepare and ask about the first exam using their regular study strategies. No intervention is required before the exam. The teacher has students complete exam wrappers after their graded exam is returned to them. The teacher collects the exam wrappers, not to grade activities but rather so they can be returned to the learners before their next exam. The teacher will also want to review students' responses to gain insight into their learning. This practice leads to a better understanding of how the students evaluate their own strengths and weaknesses. The students must begin studying and preparing for the next exam once they are done reviewing any recommendations on the first exam wrappers to include their own suggestions.

A review of the literature uncovered certain points of controversy. For example, some studies found that students did not appear to change their behavior after using exam wrappers, while other studies had positive results. The goal of implementing exam wrappers in a universal design for instruction is to train students in metacognitive skills and meet the criteria of successful exam wrapper use. This in turn could reveal how to imbed metacognition within coursework, providing insight into future directions for pedagogical practices with wrappers in schools and universities. This activity allows students to practice metacognitive skills and see an immediate change in their academic performance.

Lovett (2013) evaluated the use of exam wrappers in four courses across multiple disciplines (calculus, chemistry, introductory biology, and physics) to enhance metacognitive strategies during an academic semester. The findings demonstrated no change for students enrolled in only one course, and there was no control group. Higher gains were seen when learners used the exam wrapper across the four courses, but the researcher did not address whether using them in one course was more beneficial than not using them at all. She recommended that metacognitive skills be taught like any other skills and that they benefited from feedback and practice. Showing even less positive results, Butzler (2016) investigated the effects of implementing SRL tools (e.g., exam wrappers and notetaking) on chemistry students' achievement. The findings of a paired-samples *t*-test showed no significant difference with the addition of SRL tools.

Root Kustritz and Clarkson (2017) investigated the use of exam wrappers to help students in a first-year veterinary anatomy course self-assess their quiz preparation and employed a control group. Students in the experimental group filled out an exam wrapper after they completed the second and third out of four quizzes. The exam wrapper contained questions about quiz preparation, where they felt they had the most trouble with the quiz, and what they might do differently before the next one. The findings demonstrated no high percentage change in scores from the second to third or third to fourth lecture or quiz; however, the final exam scores improved for the experimental group. The researchers attributed students not changing their behavior from one quiz to another to a probable lack of formal training in metacognition. As a result, students did not understand the value of completing the exam wrappers or the potential advantages of utilizing their reflections. The researchers mentioned that a future study could describe the results when learning objectives particular to metacognition are involved in coursework in the veterinary curriculum.

In contrast, Achacoso (2004) found positive effects from using exam wrappers. Students increased their metacognitive strategies after using them, which was confirmed by their ability to monitor and adjust study strategies and an overall increase in their mean exam scores. Similarly, Thompson (2012) investigated using exam wrappers to enhance metacognitive self-monitoring practices among college students in a Spanish course and compared the results to a control group. The researcher used comprehensive testing to promote greater use of self-monitoring practices with modest results. The exam wrapper group did not show more gains in self-monitoring strategies—as measured by the metacognitive self-regulation scale of the motivated strategies for learning questionnaire—compared to the group without exam wrappers. However, the analysis showed that students in the control group were more proficient in Spanish at the beginning of the study, and the self-monitoring practices changed in the experimental group when students completed posttest reflection exercises and talked explicitly about study strategies in class. In other words, the mean metacognitive self-regulation score increased for students who had completed exam wrappers.

Gezer-Templeton et al. (2017) investigated students' metacognitive strategies, assessed the correlation between study behavior and student performance, and evaluated students' perceptions of exam wrappers. Exam wrapper activities were given as an extra credit assignment after the first three exams in a food science and nutrition course. The researchers analyzed student responses and exam performance, and the findings showed that most students with poor exam performance overestimated their exam scores, which meant students' self-assessment skills could be improved. However, the results also demonstrated the ability to make and implement goals to develop study strategies during the semester. The researchers observed a modest correlation between improving exam

performance and using study strategies, especially for students with a B average on exams, indicating that students within the middle of the grade distribution may benefit most from exam wrappers. Most students believed that exam wrappers helped them improve their study habits and exam scores, and they planned to use the exam wrapper process in future classes.

One of the most important requirements for creating a suitable environment for improving metacognition is that learners must prepare for scheduled classes by reviewing the class content online. This preparation enables learners to interact productively with their peers and teachers by actively participating in discussions on in-depth questions during class. Thus, learners may need to be more motivated to study the class content ahead of time. This motivation can be achieved through the integration of SRL in a flipped classroom.

Çakıroğlu and Öztürk (2017) investigated problem-based learning in a self-regulated flipped-learning (SRFL) approach to develop the SRL skills of 30 male and female Mechatronic undergraduate students. A qualitative design was used to collect the data through discussion-board messages, an observation form, and interviews with select participants. The results showed that students' skills improved but were still moderate. Learning outside the classroom helped them develop environment structuring, goal setting, and planning skills at a high level. The study recommended examining the relationship between the SRFL approach and problem-based learning in different disciplines. Future research could employ an SRFL approach by integrating SRL activities with the flipped-learning approach, and a mixed-methods design could be used for different SRL strategies. Future studies could also use pre-class asynchronous metacognitive activities with the self-reflection metacognitive instrument and exam wrappers.

Conclusion

This literature review addressed exam wrapper issues from different perspectives, providing insight into future avenues of research. However, the study could not answer all concerns about how to implement reflective wrappers to improve metacognition. More research is thus needed to answer this question and determine whether the flipped classroom is a better learning environment to implement and promote metacognitive skills and evaluation practices by having students think about their own thinking.

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