Writing to Learn: Benefits and Limitations

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Writing to learn (WTL) is the act of making a subject or topic clear to oneself by reasoning through it in writing; it is a pedagogical approach that uses writing to facilitate learning (Zinsser 1988). Some researchers have reported favorable results associated with the approach (Balgopal and Wallace 2009; Bullock 2006; Hand, Hand, Gunel, and Ulu 2009). However, others have indicated that studies supporting WTL pedagogy tend to lack comparison groups, pre/posttest data, or the rich description that contributes to a rigorous qualitative study (Hübner, Nückles, and Renkl 2010; Kieft, Rijlaarsdam, and van den Bergh 2006; Klein 1999). Thus, existing research about WTL suggests that its effectiveness depends on context, leaving a need for further research to better understand the contexts in which WTL has a favorable impact on student achievement. In response to this need, we designed this mixed-method, quasi-experimental study to include pre/posttests and qualitative analysis of WTL journals.

Writing to Learn

WTL is based on the foundational idea that writing plays a role in the learning process. Zinsser (1988) explained how it is beneficial:

> … as a writer I [often] made clear to myself some subject I had previously known nothing about by just putting one sentence after another – by reasoning my way in sequential steps to its meaning… often the act of writing even the simplest document clarified my half-formed ideas. Writing and thinking and learning were the same process. (p. ix)

Given these benefits, it follows that teachers who adopt WTL as part of their pedagogy anticipate that writing promotes student learning.

Engaging in the act of writing does not automatically enhance student learning, however; research suggests specific conditions need to be met in order for it to be effective. In a meta-analysis of 48 studies of WTL at the K-12 level, Bangert-Drowns, Hurley, and Wilkinson (2004) found that WTL can have a small to medium effect. They found the effect size increased with longer exposure to WTL experiences and when the writing task required metacognition. Further substantiating the latter finding, Hübner et al. (2010) found that WTL had a positive impact on learning when students were explicitly introduced to "specific cognitive and metacognitive strategies of self-regulated learning" (p. 18) and provided with an example of a WTL journal entry that illustrated those strategies. Kieft et al. (2006) found that WTL was more effective if the writing task matched with students' preferred writing approach. Thus, contextual factors influence WTL's impact on learning, the evidence supporting it is ambiguous, and while WTL has potential, it is not a cure-all (Bangert-Drowns et al. 2004; Newell, Koukis, and Boster 2006.).

Although evidence supporting WTL has been called ambiguous (Bangert-Drowns et al. 2004) and inconsistent (Klein 1999), WTL is used in United States as well as internationally at the collegiate and K-12 levels. This may be because the literature also includes studies that support WTL without the caveats about the relationship between context and effectiveness others have reported (e.g. Bangert-Drowns et al. 2004; Hübner et al. 2010; Kieft et al. 2006; Klein, Piacente-Cimini, and Williams 2007). For example, Stewart, Myers, and Culley (2010) found that WTL supported students' active learning, retention, and writing development in an upper-division psychology course. The college students in their treatment group engaged in ten 12-minute WTL activities over the course of a semester, and performed better than the comparison group on a 15-item multiple choice assessment during the tenth week of the semester. Stewert et al. (2010) considered the 12-minute WTL brief in terms of class time to implement and easy to grade through rubrics. Although they acknowledged that factors like class size and instructor effectiveness could also have influenced their findings, they had no reservations about the benefits of WTL itself or

the likelihood that other instructors of psychology will find it useful. They even expected that, in classes with 75 or fewer students, other instructors will find grading WTL manageable.

Literature supporting WTL is particularly well developed in the sciences. Researchers have reported that WTL supports student achievement in courses ranging from an ecology course for preservice elementary teachers (Balgopal and Wallace 2009) to high school physics (Bulluck 2006) to introductory-level college physics (Hand et al. 2009). Additionally, Klein et al. (2007) found that non-science majors at the university level had a greater level of posttest transfer of scientific concepts after processing new information in writing compared to speaking. Literature about WTL in other disciplines, particularly at the university level, appears less developed.

To address this gap and respond to the need for additional research about WTL, we designed the present study. We are an associate professor/doctoral student team. Sara has nine years of college teaching experience, including eight years teaching variations of the course under investigation in this study. Amanda is a doctoral student new to college teaching; like Sara, she has K-12 teaching experience. She helped Sara design the study and assisted with all components of the research methods described in the subsequent section.

Methods

We designed this study to answer three research questions related to our use of WTL in a college course: 1) Did student scores change from pretest to posttest? 2) If scores changed, was there a differential effect for the WTL treatment group? 3) What were students' attitudes and perceptions of the WTL process?

Participants

This mixed-methods inquiry spanned one academic year. Participants were recruited from a required upper-division course Sara taught during the fall 2010 and spring 2011 semesters. Every student agreed to participate (fall n= 25, spring n = 28). All participants were junior or seniors majoring in elementary education or dual-majoring in elementary and special education or bilingual education. Participants attended a large, public university in the Pacific Northwest. Most participants were women (fall n = 23, spring n = 24), and during both semesters half of the participants were non-traditional in age. Four of the first-semester participants were post-baccalaureate students seeking a second degree in elementary education; during the second semester, 5 participants were second-degree seekers. These demographics are typical for elementary education majors at the university. Fall semester students served as the comparison group and spring semester as the treatment group. Although the participants were a convenience sample and were not randomly assigned to groups, we believe the two groups are comparable because they are similar on demographic variables that might affect results.

Study Design

We used WTL pedagogy in spring 2011 (treatment group) but did not use it during the fall 2010 semester (comparison group). Both groups of students were enrolled in a course about social studies curriculum and instruction. The course met for 160 minutes once a week for 15 weeks. Both semesters, Sara began the class with a reading quiz (Carney, Fry, Gabrielle, and Ballard 2008; Fernald 2004) followed by a reading discussion. Then approximately one hour of each session of the method course was dedicated to preservice teachers experiencing an instructional technique that can be used with K-8 children. After experiencing the technique, Sara facilitated a whole-class conversation about how to modify the technique for use in different grade levels and how to modify the technique for children with diverse learning needs. The conversations were framed around the readings that were discussed at the beginning of each class session.

Preservice teachers in the comparison group discussed the techniques through a whole-class discussion, and then learned an additional instructional technique. The treatment group spent 15 minutes after the discussion writing in their WTL journals to reflect on their personal reaction to the instructional technique, explore applications to the K-8 classroom, and make connections to the two fundamental course objectives for the social studies methods course:

1. Understand the nature and goals of social studies as a discipline intended to foster the skills and dispositions necessary for active, participatory citizenship.

2. Know how to how to use, evaluate, and develop curriculum and instruction that honors the standards of a rigorous social studies curriculum and is inclusive of diversity, with an emphasis on instruction that provide K-8 children with meaningful learning experiences.

In order to provide time for the WTL, the treatment group, compared to the control group, learned one less pedagogical technique during each class session. Otherwise, the readings, assignments, and in-class activities were the same for both groups. Initially, Sara found cutting one pedagogical technique from each class session difficult. She used Wiggins and McTighe's (2005) model to help make thoughtful decisions about how to cover less material yet preserve the most essential learnings by deeper exploration of fewer topics.

When teaching the treatment group, we provided a different WTL prompt each week to the help students focus their writing in journals. Students were encouraged to write about something other than the prompt if they had a more compelling issue that they wished to explore. Most responded to the prompt; no more than ¼ of the students ever wrote off-prompt on any given day. Additionally, on four occasions we offered two different WTL prompts that students chose between.

We responded to each student's WTL journal before the next class, and usually within 3 days. Our goal was to provide positive feedback about metacognitive thinking that made connections to course learning outcomes and good writing, and also prompt students who did not write deep answers to be more precise in how they reflected about their learning. Although we did not analyze our responses as part of the data set, we valued the written dialogue with students. The students seemed to appreciate the personal response to their journals. During weeks 12 and 13, we prompted students to reflect about WTL as a process rather than on their response to in-class activities.

Data Sources

The treatment and comparison groups completed the same pre/posttest to measure student achievement of course goals. The pretests were administered electronically, prior to the first day of class. Posttests were completed electronically during class time on the last day of class. We designed the test specifically for the purposes of this study, and the portion analyzed for this study consisted of 11 multiple choice items.

The treatment group reflected about the WTL process during weeks 12 and 13 of the semester. During week 12, participants were asked to consider additional applications for WTL: Would you use WTL journals in your elementary classroom? If yes, how would you make it work? If not, why? Week 13 they were asked: How has WTL supported *your* learning this semester? What could have made it better? These WTL journals served as a second data source.

Lastly, during week 14 of the semester the treatment group completed a Perceptions of WTL questionnaire with 17 Likert-items. We developed two kinds of items. One set of Likert-items were based on the most common trends in the week 13 responses because we were curious if the trends were more prevalent than the WTL responses indicated. For example, two participants mentioned that their writing improved as a result of WTL, and we wondered if other students might feel that way but hadn't written about it because their journal entry focused on another aspect of WTL. Therefore, we developed the following Likert-item: My writing skills have improved as a result of WTL. The second set of Likert-items was designed to get student feedback about variations of the WTL process that we wondered about implementing in the future. For example, it was hard to make the time to respond thoughtfully to every journal entry, and we wondered if students would still value the process without instructor responses. Therefore, we developed the following Likert-items: "Without feedback from the instructor, I would take WTL just as seriously" and "I would feel more comfortable writing about important ideas if no one was going to read my WTL journal."

Data Analysis

We analyzed the treatment group's reflective writing about the WTL process using open coding (Strauss and Corbin 1998). The first step was reading and rereading each reflection closely to identify emergent themes, then grouping the emergent themes into categories and rereading the reflections to identify whether the categories were present. Ultimately we identified two thematic patterns.

We calculated the mean scores and frequencies for the Likert-items on Perceptions of WTL questionnaire. The questionnaire had a 4-point scale, with 4 indicating strong agreement with the statement and 1 indicating strong disagreement. We analyzed the pre/posttest data by conducting a 2-way Analysis of Variance (ANOVA) to determine if the improvement from pretest to posttest scores was significantly different between the comparison and treatment groups.

Limitations

There were limitations in our study design in that we used a convenience sample, a quasi-experimental design, and our participants were juniors and seniors at the same university taking the same required course in their major. Given these limitations and our relatively small number of participants, we do not suggest that our findings are generalizable to other populations. However, we offer our findings as a contribution to the growing body of literature about WTL which continues to make clear that the effectiveness of this pedagogical approach is dependent on context. We discuss practical implications and pedagogical suggestions of our findings that may be useful for other college instructors considering using WTL.

Findings

Student Achievement of Course Objectives

Our first research questions asked: Did student scores change from pretest to posttest? To answer this question we first analyzed the pretest and posttest scores using a paired samples t-test. Our analysis revealed a positive increase in knowledge of course objective for both groups $t(52) = 8.13$, $p < .01$, as measured by our instrument. Interpreted, our analysis indicates students experienced significant gains in their knowledge of course content over the semester.

Next, we wanted to determine if there was a differential effect for the WTL treatment group. Thus, we conducted an ANOVA using class as the factor and the difference in pre/posttest scores as the variable. Our analysis revealed there was no significant difference between groups. Thus, it appears that the WTL intervention did not have a significant or notably differential influence on student posttest performance. It is also worth noting that taking class time for WTL did not diminish student learning of course content as measured by the pre/posttest, and it did provide an opportunity for students to enhance their metacognitive and reflective thinking skills. The latter may be responsible for the positive student response to WTL, which we discuss in the subsequent section.

Student Perceptions of WTL

Our third research question asked: What are students' attitudes and perceptions of the WTL process? The qualitative data revealed two common positive perceptions: WTL was a valuable process that facilitated reflection, and the instructor feedback was valuable. Twenty students were in class the day that we prompted them to use their WTL journals to reflect on how WTL supported their learning. Eighteen specifically indicated the value of the instructor feedback. The following two reflections are representative of the kinds of positive comments students wrote: "I don't think WTL would have made as big of an impact if we didn't get feedback" and "All students like to know where they stand with something, whether it be a test, a project, or just some part of the material they may not quite understand." This positive perception of instructor feedback was also supported by the results of the Perceptions of WTL questionnaire. The item "Getting feedback from the instructor on WTL journals is meaningful" had a mean of 3.6 on a 4-point scale. Given the nearly unanimous praise for WTL feedback, it seems instructor response was valued by the students.

Twelve out of 20 participants indicated that they appreciated having time to focus on their own learning, reflect on the day's topic, and to express their thoughts. The following comment is representative of the main ideas students shared: "It gives me the opportunity to reflect about what I learn and helps me determine what learning has made an impact on my thinking." Four students also wrote comments that suggest WTL may have tacitly supported their development as writers as well. For example, one wrote "It encouraged me to know that my opinions were clear and understood by someone else."

The Perceptions of WTL questionnaire also provided evidence that time for reflection and instructor responses had the additional benefit of promoting student achievement in the course. The item "WTL felt like formative assessment because it helped me know I was on the right track" had a mean of 3.2 on a 4-point scale. The item "WTL has helped me be more successful in this class" had a mean of 3.1. Thus, it seems the majority of students believed WTL was helpful. The mean for the item about whether WTL enhanced students' skills as writers was 2.8, suggesting that collectively there was only a moderate level of agreement. It is worth noting that while eight participants disagreed with the statement, none strongly disagreed, three strongly agreed, and the others agreed. Despite differing student perceptions about whether WTL enhanced their writing skills, our qualitative analysis suggested that many students improved in their metacognitive and reflective thinking over the course of the semester as evidenced by deeper, richer writing in response to the prompts. Although students themselves may not have felt it was helpful, we noticed improvement. Overall, student perceptions of WTL were favorable.

Discussion

Initially we were surprised and even disappointed that the treatment group did not have significantly higher growth on the pre/posttest. Upon reflection we recognized that this does not necessarily mean WTL was not helpful. It may be that the way we implemented WTL was not effective in raising posttest scores, but other models might have greater impact. It is also possible that because the course already required a substantial amount of writing outside of class, comparison group students also benefitted from WTL and the additional in-class time did not make a significant difference for the treatment group. Since students had a favorable response to WTL and we observed pedagogical benefits, the findings indicate potential benefits for WTL. Based on these benefits, we offer three suggestions for faculty who interested in implementing WTL in their classes.

Ask the Right Question at the Right Time

We recommend that professors be thoughtful about what kinds of questions they ask at different times in the semester. Bloom's Taxonomy of Educational Objectives (1956) provides a framework for thinking about questions. Bloom (1956) indicated that teachers can help students retain material through the use of different types and levels of processing. Bloom's (1956) levels of processing are, in order of complexity: knowledge, comprehension, application, analysis, synthesis, and evaluation. While WTL prompts that address knowledge and comprehension may be appropriate for the start of the semester in order to support students in gaining confidence with content and the concept of WTL journals, such prompts may not be thought provoking enough toward the end of the semester.

For example, during the second week of the semester, we asked a question that primarily required students to use lower levels of processing in Bloom's Taxonomy (1956): knowledge and comprehension. However, the prompt also asked students to write in the format of a friendly letter to a World War II veteran with no teaching background. As a result, student journals were free of educational jargon and their responses made it clear that they understood the content. Despite the relatively simple nature of the question, responses were reflective, metacognitive, and engaging. We speculate that the enthusiastic response Sara provided to each student helped them gain confidence in their WTL work. Thus, it seems that a simple question can be very useful, particularly when the prompt is used early in the semester.

During week 10 we asked another question at the knowledge and comprehension levels of Bloom's Taxonomy (1956). The prompt did not require students to extend their thinking more deeply, which, in retrospect, would have been appropriate. Students were capable of deeper level of thinking and reflective writing by this point in the semester. Indeed, during the fourth week, they wrote engaging, insightful responses about a thought-provoking guest speaker in response to a prompt that required thinking at Bloom's (1956) fourth level of thinking: analysis. It was a mistake to return to lower levels of thinking on Bloom's Taxonomy later in the semester. We were further reminded of their abilities during week 12, when students successfully wrote in response to a prompt that drew on three of the four highest levels of Bloom's Taxonomy (1956): application, analysis, and evaluation. Thus, we recommend that faculty consider providing students with more complex WTL prompts as the semester progresses as our experience suggests students will be up for the challenge of complex questions after early scaffolding.

Be Honest About the Time Commitment

WTL takes time – both in class for students to write and out of class for instructors to respond. Our experiences were contrary to those reported by Stewert et al. (2010) who considered 12-minute WTL brief to implement and easy to grade through rubrics. Making the time for WTL in class may necessitate reducing the time available for other learning experiences and content. We realize that the depth versus breadth dilemma is common in education; however, we also recognize the benefits for learners when they are immersed in deep learning (see Wiggins and McTighe 2005 for discussion of teaching for enduring understanding rather than coverage of more content).

It is important to acknowledge that we also differed from Stewert el al. (2010) in that we felt uncomfortable grading student WTL journals since they were being analyzed for research purposes. The journals were used as formative assessment to promote student learning. Including WTL as a graded required course assignment, being careful to adjust assignments so WTL does not merely add "one more thing" to an already demanding course, could mitigate some of the problems we had with the time-intensive nature of responding to student journals.

Responding to the WTL journals each week as we did in this study may not be sustainable for some instructors because of the time-consuming nature. It became apparent to us that there is a real possibility that the required commitment may exceed capacity. Thus, we intend to design future studies to explore the amount of instructor feedback students need to reap benefits from WTL activities. For example we are considering collecting and responding to 1/3 of the entries each week and examining the impact on student engagement and perceptions of WTL. Another alternative is for the instructor to respond to selected journal entries and students respond to peers for the other entries.

There Might Be Unexpected Benefits

Even though it was time intensive, we agree with Baker et al. (2008) that providing students with detailed feedback is an important component of WTL. Students indicated appreciation for the depth of feedback in their evaluations of WTL as well as the overall course evaluations. Sara felt that the time she spent reading and responding to WTL journals helped her develop a particularly positive rapport with the class compared to other semesters. She felt like she got to know students more quickly than usual while teaching a fairly large class of 25 to 30 students and only seeing them once a week. This was due, in part, to students sharing information about their previous experiences in their WTL journals. For example, in the first week one student wrote:

> One thing that I believe my school failed to do is [help me learn to] question beliefs and explore different ways to think about one thing. For the longest time I only really believed what my parents told me about politics, religion etc. It wasn't until a few years ago, and a really great professor, that I started to ask myself why I thought the things I thought.

This entry, and those other students wrote that week and throughout the semester, helped Sara learn how the student had already thought about multiple perspectives in previous coursework, and was able to use that knowledge to help scaffold the mastery of current course objectives.

It was particularly hard to make time to respond during the first few weeks of the semester when there were numerous meetings and other start-of-school obligations. However, Sara found the chance for additional dialogue with her students particularly beneficial and enjoyable early in the semester. Although the student evaluations of the course and Sara's teaching were not significantly higher or lower than previous semesters, she felt that the time she spent responding to WTL journals led her to be more enthusiastic about her students as thinkers, learners, and future teachers.

Another unanticipated benefit of WTL journals is Sara was able to identify students who seemed to struggle with writing early in the semester, before any major graded assignments were due. She invited these students in for writing help and encouraged them to schedule appointments with the university's writing center to promote their success in the course.

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WTL also provides students with an additional way to participate in course dialogue. As we both are committed to helping our students develop their skills as readers, writers, thinkers, and speakers, it was rewarding to learn through WTL journals that even those students who were reluctant to speak during class discussions were engaging with course content in meaningful ways. WTL provided us with a regular indicator of nonverbal attentiveness to course content, and helped those students who were too shy to be active participants in class discussion develop their written voice.

In conclusion, the unexpected benefits made the time invested in WTL feel worthwhile even though 1) it was hard to make the time to read and respond thoughtfully, and 2) the pre/posttest results indicated that our approach to WTL did not necessarily lead to improved learning and achievement of course objectives. We encourage faculty interested in including WTL in their courses to do so mindfully, as the way in which WTL is implemented has a tremendous impact on whether it has a positive influence on students.

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