Supporting Community and Communication through Online Learning Journals

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Education Notes bring mathematical and educational ideas forth to the CMS readership in a manner that promotes discussion of relevant topics including research, activities, issues, and noteworthy news items. Comments, suggestions, and submissions are welcome.

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Our motivation and goals

The COVID-19 pandemic has highlighted and magnified issues that have always been present in our classrooms: student course preparedness, the flexibility of students' study habits, and the ability to self-assess and reflect on course content and effectiveness of their learning, among others. One of the most prominent concerns of students in the remote environment has been self-regulation, time management and falling behind on their coursework [1, 2]; after all, if the lectures are recorded, it is easy to procrastinate engaging with the material. Once behind, the priority becomes catching up with the material, as opposed to cultivating deep understanding. The shortage of student collaboration — more present in live courses during in-class group work and outside of class time in informal study groups — also results in fewer opportunities for students to see each others' work, witness and discuss varying viewpoints. On the other hand, more structured and deliberate instructor-student online interactions lower the frequency and effectiveness of communication [3]. This affects the feedback loop for both parties involved: students get less input from the instructor regarding their progress, while the instructor gets less of an insight into students' process of learning and points of struggle. In our experience, students have few opportunities to reflect on their knowledge during the course of the semester, so as instructors we would like to implement more qualitative assessments for students to see the course as a whole and not just the sum of its parts.

Undergraduate curricula can be jam-packed with content and "doing": homework, quizzes, projects, and tests where students are (sometimes mindlessly) working through problem after problem. As instructors, we hope that our students have an appreciation for what they learn each week and why that content is important, but recognize that we may not provide assessments and reflection opportunities that align with this learning outcome. To this end, many institutions are now including *affective outcomes* in their course outlines, such as, "advocate for the value of *topic* in *context*". In their curriculum guidelines for undergraduate courses, the Mathematical Association of America suggests "mathematics faculty should deliver an unambiguous message concerning the importance of mathematical reasoning and communication skills and adopt instructional methods and curriculum content that develop these skills" [4]. Large scale, high-stakes projects that come at the end of a course have the potential to fit this bill, but are generally not intended for the gradual development of communication skills throughout the course of a semester. Ask yourself: do you have purposeful opportunities for your students to sit back and consider what was being done, why they did it, and what they learned (or didn't) throughout your course?

We present the idea of *learning journals* as a low-stakes, small-scale assessment for learning, which provides students a regular space to sit down and reflect on the simple question of "what did I do this week?" The structure of these online journals provide a virtual space for students to communicate with each other, answer each other's questions, and gain an alternative understanding of the content, as described by their peers. The journals also allow the instructor an insight into student processes, as well as the depth and richness of students' understanding beyond being able to carry out calculations or problem solve.

The What, How, and Why of Learning Journals

The learning journals used in our courses were done on a bi-weekly basis. The Learning Management System (LMS) at our institution is Blackboard, so we took advantage of the "Blogs" course tool built into the LMS. In creating these blogs, we chose the "course blog" option that allowed all students to view and comment on the posts of their peers.

The learning journals were employed in five distinct courses: Calculus I for Business, Calculus II for Life Sciences, Calculus II for Physical Sciences, Calculus III, and second-year Linear Algebra. Our courses varied in format (from fully asynchronous to virtual "flipped"), but the primary course content was always presented in pre-recorded videos scheduled for students to watch each week. Students were instructed to not write their learning journal until after they had watched all lecture videos and completed the associated homework assignment. As such, the learning journal was always due after the associated homework for the week's content was due. For example, the learning journal for weeks 2 and 3 would be due on the Saturday of week 4. This deadline is fundamental to the learning journal idea; the intent of these journals is to provide a space for students to regularly reflect on their learning process, so this deadline was integrated into their weekly "to-do's".

Each learning journal included the following instructions and rubric (credit and thanks to Cindy Blois (UofT) for her communication rubric).

Write between 400-500 words summarizing what you learned these past two weeks. The goal is to synthesize the content and your learning from this week. To help guide your writing, please respond to the following questions, with your peers being your target audience:

- **What?** Give an objective discussion of content. What was the focus of our study? What tools did we need? What ideas were developed?
- **So what?** Why are these ideas useful? How can we (or did we) use them? What is challenging?
- **Now what?** How can you better understand the content? What problems/examples were helpful? What do you need to do more of to further your understanding? What lingering questions do you have?

Once you are done with your post, answer one of your peer's questions from "So what?" If you don't have a complete answer, that's OK. The goal is to try to share some of your insight and understanding on a topic your peer (and possibly yourself) is having trouble with.

Marking of learning journal entries will be done on a scale of 0-3:

- 0 – (non-existent or needs work) Didn't complete or cheated. No full sentences are included. Writing is insufficient or mostly incomprehensible to an expert. Sentences are sparse or not understandable. The mathematics has been attempted to be described but many of the main points are either not described or are incorrect.
- 1 – (Satisfactory) Explanation is comprehensible but there are several sentences that are unclear, even to an expert. Most logical steps of the mathematics are shown, but there is at least one major error or gap in reasoning.
- 2 – (Good) Explanation is clear to an expert in the subject but may be confusing to peers in a few parts. One or two minor mathematical or logical errors have been made, such as improper notation or use of language. Main logical steps are correct.
- 3 – (Excellent) Explanation is clear and easy to understand. Visual aids such as pictures are included, if helpful. Mathematically, there are essentially no errors in reasoning or computation. All reasoning is shown. A deduction of 1 mark will be taken if no reply to a peer is posted.

The instructions and rubric for the learning journals were intentionally free-form. These journals were less an assessment of students' understanding of the content through specific problems, as they were an opportunity to reflect on their learning process. Students were explicitly asked to write with their peers as the audience, so as to avoid the use of overly technical language and jargon. In addition, students were also provided with a "sample" learning journal post, to give them a rough idea of the level of breadth and depth required in exposition.

In the first iteration of the learning journals, they were chosen to be done on a weekly basis, with entries being at least 250 words. The instructor quickly realized that this frequency was far too much of a workload for both students and instructor. For students, writing is a time-consuming task and not the one they are used to doing in mathematics. For the instructor, reading over 100 posts every week – on top of the other demands of preparing a remote course – was an unreasonable demand on time. Moreover, a week's worth of material didn't always provide fertile ground for deep connections within the material itself. As such, the learning journals were completed on a bi-weekly basis during the subsequent terms.

With the switch to a bi-weekly format, students were asked to write entries that were 400-500 words, to account for entries which covered two weeks worth of content. The bi-weekly format also encouraged students to consider how the two weeks of content were connected to each other. For example, in calculus courses, top marks were reserved for students who presented various representations of objects (analytic, numerical, graphical and verbal) and made meaningful connections to other course topics, other classes or areas of interest.

The open-ended nature of the rubric was pivotal in keeping the workload associated to this assignment in a reasonable range. While we wanted to give students reasonable feedback, this also needed to be balanced with the associated workload of reading and marking the entries. Short individual feedback was provided alongside to each student during grading. In a synchronous format, the instructor mentioned common themes and observations during class sessions. In an asynchronous format, the instructor sent out weekly digests with class-wide feedback on Learning Journals, including student quotes.

Our view of impact

The visibility of posts to the entire class serves to create a community of learning in the remote environment. With a requirement to reply to peer's posts, students get to see how their learning experience relates to their peers' and often see that they are not alone in their struggles and victories. The prompt also gives students an opportunity to try to respond to a students' question, which will challenge them to parse a question relative to their own understanding. This view of impact was valued by students, who remarked the following:

> *I learn so much from reading other's journals. Everyone has different background science knowledge, like there would be applications of calc in other study areas that I would never even think of but reading through journals is how I get to learn about other science applications. There's just so much we can learn from others.*
>
> *The journal entries are helpful because I think we can all reflect and see how all our peers are thinking in comparison to us. I think the conceptual part of learning math is the most important because "plugging and chugging" is not going to work anymore.*

The blog format where students could all see each other's entries also aids in the understanding that the intended audience consists of peers and not the instructor, avoiding the expectation that the reader is an expert. Articulating the material through writing allows students to organize their thoughts into one coherent logical sequence and fill gaps in their knowledge as they discover them through the writing process. It also highlights the importance of various representations of mathematical concepts — verbal, graphical, analytical and numerical. Writing these journals required students to engage with the material in a novel way and required them to go deeper, as evidenced by their testimonies:

> *I would say it was somewhat a good use of time as it allowed me to make sure I understood a concept enough that I coud (sic) write about it.*
>
> *We spend a lot of time learning to make calculations, however we don't always have a chance to explain how we did it or why we should learn it. These journals helped answer those questions!*
>
> *Doing the learning journals made me do additional research on multiple topics which added to my understanding of those topics.*

The additional benefit of the journals was in providing an easy, low-commitment forum to connect and create a sense of community, see what your peers struggled with and hear their voices in a remote environment. In both their journals and in comments, students often shared useful resources or study tips that they found to be helpful.

> *They are very useful to understand topic and get the extra help, they also allow you to learn shortcuts that other students found to help understand the topic even more.*
>
> *I believe that the learning journals were a great part of the course as they not only allowed for students to learn from teaching, but also interact with one another and view topics from the understanding of their peers.*

We ran a survey in a class of 44 students and received 33 responses. Of those who responded, over 70% of students said that they spent between over 30 minutes but under 2 hours on each learning journal entry, but none thought the time commitment was burdensome. In fact, some students specifically mentioned the reasonable workload and positive learning experience in their comments:

> *The learning journals weren't much of a workload especially since they were given every second week, giving students enough time to understand concepts. Other than that, these journals were a great learning experience especially since you could gain knowledge from reading other classmate's posts too. They were a great experience and fun too!*
>
> *[The learning journals were] not too too time consuming so there isn't any loss for students, more so much more gain in learning experiences. It is also easier for students to understand something that their peers wrote more clearly in some cases.*

Nearly half the students reported that on average they read 2-3 peers posts, while over a third of students said they read at least 4 peer posts. Over 80% of respondents advised that the instructor should keep learning journals for future offerings of this course. Interestingly, here are the comments from the only 2 students out of 30 said that they would not recommend Learning Journals as a course component:

> *I understand the reason why you implemented them in the course work but I don't think we need to have this in-depth understanding of each topic in order to be successful in the course. It feels like a burden and I don't think it's necessary, especially in a math course.*

> *I found I was choosing to stick to the materials I understood better rather than practicing skills that needed to be improved.*

We believe that students' positive experiences with Learning Journals as opposed to generally dreaded formal writing assignments can be attributed to the fact that the journals provided small, low-stakes writing opportunities. Coupled with the normalizing effect of seeing their peers' writings and getting instructor feedback, students were able to gradually build their communication skills with the support of the course community and with opportunity for growth.

An unexpected benefit to instructors was getting insight into students' experiences in their other courses. Specifically, in Calculus II for Life Sciences, students wrote about science applications in the fields of ecology, biology, forestry, agriculture, and geography. Examples were both authentic and relatable, which allowed the instructor to use them as inspiration for the design of additional class problems and course projects.

Concluding remarks

The implementation of online learning journals was born from the concern that the remote, online learning environment could have a detrimental impact on the course community. In their review of blogs in higher education, Williams and Jacobs [5] remark that "blogs have the potential, at least, to be a truly transformational technology in that they provide students with a high level of autonomy while simultaneously providing opportunity for greater interaction with peers" (p. 244). This sentiment is echoed by Ellison and Wu [6] who found that students enjoyed the blogging process and found their peers' blogs to aid in their own understanding of course material. Based on the feedback we have received from our students and presented above, we believe that our experiences in employing online learning journals further support these claims.

For both of us, having students come together and discuss their understandings and misunderstandings is fundamental to the teaching and learning process. As universities begin the transition from remote to in-person learning, both of us intend to keep online learning journals in our future courses. Cuhadar and Kuzu [7] observed that online blogs can positively impact community in face-to-face class meetings. They found that the online blog interactions supported students in feeling more comfortable communicating with both their peers and the instructor during in-person meetings. Beyond increasing community and collaboration, online learning journals have the potential to support a safe space for student learning. Indeed, students who may feel uncomfortable speaking up in a face-to-face class have an opportunity to find a voice in the online blog environment [8, 9]. The creation of a learning space that welcomes these students can foster a sense of belonging to the group [10], which brings us back to our initial goal of supporting community.

Online learning journals are small-scale, low-stakes writing assignments, which require students to reflect, write, read, and inquire. We hope that our remarks, as well as those of our students, persuade you to give learning journals a chance. Our students valued the experiences, struggles, and victories of their peers through learning journals, and just like them, we look forward to hearing your experiences in implementing learning journals for supporting community and communication.

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Reference

[1] Rasheed, R. A., Kamsin, A., Abdullah, N. A. (2020) Challenges in the online component of blended learning: A systematic review, *Computers & Education*, 144.

[2] Carter, R. A., Rice, M., Yang, S., Jackson, H. A. (2020) Self-regulated learning in online learning environments: strategies for remote learning, *Information and Learning Sciences*, 121, 321-329.

[3] Tang, T., Abuhmaid, A. M., Olaimat, M., Oudat, D. M., Aldhaeebi, M., & Bamanger, E. (2020). Efficiency of flipped classroom with online-based teaching under COVID-19. *Interactive Learning Environments*, 1-12.

[4] Barker, W., Bressoud, D., Epp, S., Ganter, S., Haver, B., & Pollatsek, H. (2004). *Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide, 2004*. Washington, DC: The Mathematical Association of America.

[5] Williams, J. B., & Jacobs, J. (2004). Exploring the use of blogs as learning spaces in the higher education sector. *Australasian Journal of Educational Technology*, 20(2), 232–247

[6] Ellison, N. B., & Wu, Y. (2008). Blogging in the classroom: A preliminary exploration of student attitudes and impact on comprehension. *Journal of Educational Multimedia and Hypermedia*, 17(1), 99–122.

[7] Cuhadar, C., & Abdullah, K. U. Z. U. (2010). Improving interaction through blogs in a constructivist learning environment. *Turkish Online Journal of Distance Education*, 11(1), 134-161

[8] Johnson, E. L., & Green, K. H. (2007). Promoting mathematical communication and community via blackboard. *Primus*, 17(4), 325-337.

[9] Davi, A., Frydenberg, M., & Gulati, G. J. (2007). Blogging across the disciplines: Integrating technology to enhance liberal learning. *MERLOT Journal of Online Learning and teaching*, 3(3), 222-233.

[10] Kuo, Y. C., Belland, B. R., & Kuo, Y. T. (2017). Learning through blogging: Students' perspectives in collaborative blog-enhanced learning communities. *Journal of Educational Technology & Society*, 20(2), 37-50.

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