Online Portfolio: An Alternative to a Research Paper as a Final Assessment†

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Research papers are a common end-of-semester assessment for senior-level seminars. The mid-semester switch to remote learning due to COVID-19 allowed for the opportunity to rethink this model and to provide for an alternative final assessment using a multi-part online portfolio that addresses the learning goals of the course and the objectives of research paper-based final assessments. The smaller weekly tasks coupled with ongoing peer feedback reduced student stress and allowed for creativity and community building. Students responded positively to the novel assignment.

INTRODUCTION

Senior seminars in life sciences departments often conclude with a research paper serving as the final, summative assessment. The unique circumstances of the Spring 2020 semester, occurring during the beginning of the COVID-19 pandemic, provided the opportunity to rethink the final assessment to accommodate students engaged in remote learning and likely working under conditions of significant stress. Here we describe an online portfolio approach to a final assessment used in a senior seminar with curriculum based on close reading of primary literature. This assignment allows students to complete smaller components weekly and package them together into one final product. Additionally, the portfolio allowed students to infuse creativity into their work while still ensuring that the assessment was aligned with course learning goals and the objectives of the original final project.

Online portfolios are a common form of assessment in fully online learning environments and have been used in multiple disciplines in higher education (1). Online portfolios can be used as summative assessments and can be aligned to learning goals, including goals related to higher order cognitive skills (1–3). Google Sites is one of several platforms used by instructors to include online portfolios in their courses (1). Further, by infusing creativity into the portfolio activities, the portfolio approach can increase the motivation and engagement of the students (4).

This assessment was used in NEUR1930L – Neurobiology of Love at Brown University, but is applicable to typical life sciences seminars. NEUR1930L is an advanced neurobiology seminar with an enrollment of 15 students. This discussion-based course explores the underlying neurobiological principles of love and attachment through the readings of primary literature, review papers, and popular press articles on similar topics. Course learning goals include understanding the mechanisms underlying love and attachment, interpreting and evaluating neurobiological research relevant to love and attachment, predicting the results of some experiments, proposing and designing experiments, and becoming a critical reader of popular scientific articles. The course’s original final assessment was a research paper addressing all but the last of these goals, while the switch to an online portfolio allowed for all to be addressed. Further, the original research paper had objectives around synthesizing information and giving and receiving peer feedback, as well as giving an oral presentation. These additional objectives were preserved in the online portfolio assessment.

PROCEDURE

The complete assignment with assessment rubrics is provided in Appendix 1 and summarized here. For both the original research project and the novel online portfolio, each student begins by proposing their own focus question on a relevant topic to explore more deeply. Students also create an annotated bibliography of course readings throughout the semester, with this focus question in mind. The question should be established and the annotated bibliography begun near the beginning of the semester.
With the questions set and bibliography already in progress, we restructured the final research paper into a project with smaller components distributed over 5 weeks. Based on a Google Sites template provided by the instructor (see https://sites.google.com/brown.edu/neur1930lsample-project), each student created a website to serve as their portfolio. Appendix 2 shows an example customized by a student. No students in the class reported any difficulties using Google Sites with the template.

Table 1 outlines the activities that the students added to their portfolio each week, aligned to the course learning goals. These activities include captioning a pre-existing figure, proposing new experiments, creating and capturing a novel figure, developing a creation for the general population.

### Table 1.

Week-by-week portfolio description and learning goals alignment.

| Project wk | Suggested Semester wk | Summary | Activities | Learning goals |
|------------|------------------------|---------|------------|---------------|
| wk 0       | Prior to wk 10 (recommend around wk 4) | Question and Annotated Bibliography | Propose a focus question on a topic relevant to the course Begin an annotated bibliography of course readings with the focus question in mind | Understanding neurobiological mechanisms Interpreting and evaluating neurobiological research relevant to love and attachment |
| wk 1       | wk 10                  | Figure Caption | Find a pre-existing figure from the scientific literature that could help answer the focus question Caption the figure by identifying and interpreting (5, 6) the data as they relate to the question | |
| wk 2       | wk 11                  | expt Proposals | Write brief proposals for two experiments, one with human subjects, the other with animal models, to address the question | Proposing and designing experiments to test new ideas about love and attachment |
| wk 3       | wk 12                  | Novel Figure (with caption) | Create a new summary figure OR Create a “predicted data” figure based on one of the proposed experiments from the previous wk Provide a caption | Predicting the results of neurobiological experiments Interpreting and evaluating neurobiological research relevant to love and attachment |
| wk 4       | wk 13                  | Popular “Creation” | Create something that communicates and answers the focus question for a scientifically lay audience, such as an online article, podcast or video | Improving students’ abilities to be critical readers of popular scientific articles |
| wk 5       | wk 14                  | Abstract | Write an abstract to accompany their portfolio and link to their completed annotated bibliography | Synthesizing neurobiological information |
| wk 5       | wk 14                  | Presentation | Give a brief presentation about their work to the class | |

This table contains the week within the portfolio project for each activity, the corresponding week within the course (assuming a 14-week semester), a summary of the weekly activities, a brief description of the weekly activities, and the alignment of the activities to the course learning goals. More details of the portfolio activities can be found in Appendix 1.
related to their question, and writing an abstract of their work.

The presentation and peer review components from the original paper are retained in this final assignment. Students briefly shared their project with the class in an online group meeting. For the peer review, students are placed in groups of 3 to 4 and provide feedback to each other after each component is due. This also serves to maintain class community in an online setting.

CONCLUSION

The online portfolio project was designed to allow students to both explore science that intrigues them and demonstrate their abilities to evaluate the course materials in a manageable and forgiving medium considering the acuteness of the COVID-19 pandemic. An advantage of the online portfolio is its structured, manageable, weekly tasks. The temporal spacing of the workload allows students to meaningfully engage with the content in an approachable manner, without the acute stress of a standard research paper.

The compartmentalization of the online portfolio was designed so that each week’s assignment would build on the prior work, creating a clear through-line and connecting the assignment to the learning objectives of the course. Additionally, the weekly structure of the novel assessment created natural checkpoints for students to provide feedback on their classmates’ progress. This resulted in community building through helping others improve the quality and clarity of their work.

The students especially enjoyed the popular creation, where they presented the scientific findings and concepts related to their question to a scientifically lay audience. As the most open-ended and personalizable portion of the novel assessment, this assignment sparked creativity ranging from podcasts, imitations of popular science communication, a computer animation, and a song written about the neurobiology of attachment (see Appendix 3 for examples).

We did not formally assess the effectiveness of the online portfolio as the final summative assessment for the course. However, the student feedback about the online portfolio was universally positive and centered around how the project translated well to remote learning and did not overwhelm students going through an already high stress period. The students broadly agreed that the novel assessment was a manageable format and gave them the opportunity to demonstrate their scientific acumen and their writing skills without provoking undue stress. A number of students remarked that they benefited much more from the novel assessment than they would have with a standard research paper as previously planned. Instructors interested in formally determining the effectiveness of the online portfolio could assess students’ perceptions using a tool such as the survey described by Buzzetto-More (2) or the Student Assessment of Learning Gains (SALG) (7, 8). Because of the success of the new final assessment, we will continue to refine the online portfolio and incorporate it into other primary literature-based courses for both remote and in-person learning in future semesters.

SUPPLEMENTAL MATERIALS

Appendix 1: Complete assignment instructions with rubrics
Appendix 2: Example portfolio cover page
Appendix 2: Example student popular creations

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