Chapter 4

Creating Museum Exhibits

Faculty-Librarian Collaboration within a First-Year Research Course

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Introduction

Integrating information literacy (IL) into credit-bearing courses is not a new topic for librarians, but few are able to go beyond the traditional one-shot session. Some are able to become embedded in a class, with varying levels of input on the assignments described in the literature. This chapter reports on what could be considered a highly collaborative embedded model of instruction, where the librarians were co-instructors of record and successfully scaffolded IL throughout a semester- or year-long credit-bearing First Year Research Experience (FYRE) course. Recognition of a role for this sustained collaboration between the authors—a museum director and subject librarians—in a research- and writing-intensive service-learning course led to development and delivery of a museum studies course. It was built on a series of student writing assignments and projects that developed specific skill sets in writing practice and critical evaluation and digesting of information. Operating in the context of an undergraduate research experience program,

the course provided an opportunity for first-year students from a variety of majors and backgrounds to develop greater facility as competent consumers of scientific and other professional and academic writing and as producers of original writing to be installed as components of museum exhibits.

Background

Miami University is a public institution in Oxford, Ohio, with roughly 20,000 students, the vast majority of whom (around 17,500) are undergraduates. Miami is designated as an R2 "high research activity" institution in the Carnegie Classification and has a strong tradition of faculty and staff mentorship of students. Despite this, only around 16 percent of undergraduate students indicated that they participated in a research experience during their time at Miami.[1] Although involvement in independent or original research is not traditionally a formal requirement for many undergraduate majors at Miami, opportunity for participation in research laboratories and other original research activities is seen as a component of the university's undergraduate brand. Familiarity with the scientific process is an increasingly important nexus of liberal education.[2] Further, the ability to approach problems empirically is an important skill for leadership and progress in many fields.[3] Recognizing this, Miami implemented the FYRE program in 2009 with the goal of increasing the proportion of undergraduates who participate in research. This program has had several iterations of its approach in promoting faculty-student engagement in research, but in recent years has focused on a course-based undergraduate research experience (CURE) model, with a credit course serving as a container for student group research projects spanning one or two semesters. In this iteration, one or more instructors work with a small group of approximately fifteen students to answer questions and implement solutions using research methodology. The CURE model has gained traction over the past decade as a sustainable means of engaging students in rich, science process–driven research experiences that meet both student and faculty priorities.[4] Many of Miami's FYRE courses have the students work through a traditional research cycle: identifying a research question, designing and outlining the methodology, collecting and analyzing data, and disseminating findings through a final report, paper, or product. Thus, many of the courses are centered around the physical, biological, or social sciences and attract students already interested in those disciplines or those who view research within this traditional paradigm.

Librarians at Miami have closely partnered with the FYRE program since its inception, taking on different roles throughout the years. In some previous incarnations of FYRE coursework, the main role of the librarian has primarily been as instructor for one-shot IL sessions—essentially training students how to perform discrete tasks to access and use library resources, filter information, read papers, and build bibliographies. However, program leaders recognized that students in the current model for FYRE courses would benefit from more sustained involvement in literature research methodology and conversations on the evaluation and use of information because the

students become involved in real interpretation and assessment of information toward decision-making and real-life solutions to problems. Additionally, a large portion of students in the FYRE program come from less-advantaged educational backgrounds and in some cases have limited prior experience with critical evaluation of writing, especially academic and scientific writing. Acknowledging the need to develop strong foundational skills in the students and recognizing the program as a university priority, librarians thus have been able to engage as full course co-instructors in recent FYRE courses.

As previously mentioned, the FYRE program was originally centered on STEM fields and has been successful in attracting and training STEM-focused students, but has been less successful in appealing to students outside of the hard sciences. In an attempt to rectify this, a new course was added in 2018 and continued into 2019 centered around creating museum exhibits. This course still requires understanding and use of scientific methodology for the creation and administration of formative and summative exhibit evaluations, and it also requires students to develop significant IL skills as they research topics and write labels for a museum exhibit. However, in contrast to the typical STEM research process, this course also includes diverse topics such as pedagogy, color usage, sculpture, and graphic design. In short, the course explicitly studies creativity and empiricism in parallel.

The new course also allows greater instructional involvement by library staff, as well as developing librarian collaborations with faculty and staff. Course author and director of the Hefner Museum of Natural History on campus, Steve Sullivan, focuses on content related to exhibit design and development and provides subject matter expertise. Ginny Boehme, science librarian, co-instructs with a focus on IL and research skills. Kevin Messner, department head of the reference and instruction librarians, also co-instructs as part of a specific research goal and campus exhibit proposal. While the original concept for the course came from the museum, the members of the instructional team view themselves as coequal; in fact, discussions for future iterations of the course have included the possibility of it being taught solely by the librarian instructors.

The Course

The course, Creating Museum Exhibits, is designed to involve students in all aspects of research, development, and creation of a fact-based exhibit. This includes research not only of content for the exhibit, but also about the audience itself and the most effective presentation methods to reach that audience. This course has primarily focused on an existing exhibit spanning Miami's campus, generally referred to as the Campus Tree Walks. Created roughly thirty-five years ago by a passionate group of students and faculty, the walks take visitors along several paths around the university, showing off the rich species diversity present on campus. In the past, visitors could pick up a brochure containing maps of the three different paths (see figure 4.1). The numbers on the maps correspond to red plastic numbers on posts installed near each tree being highlighted (see figure 4.2).

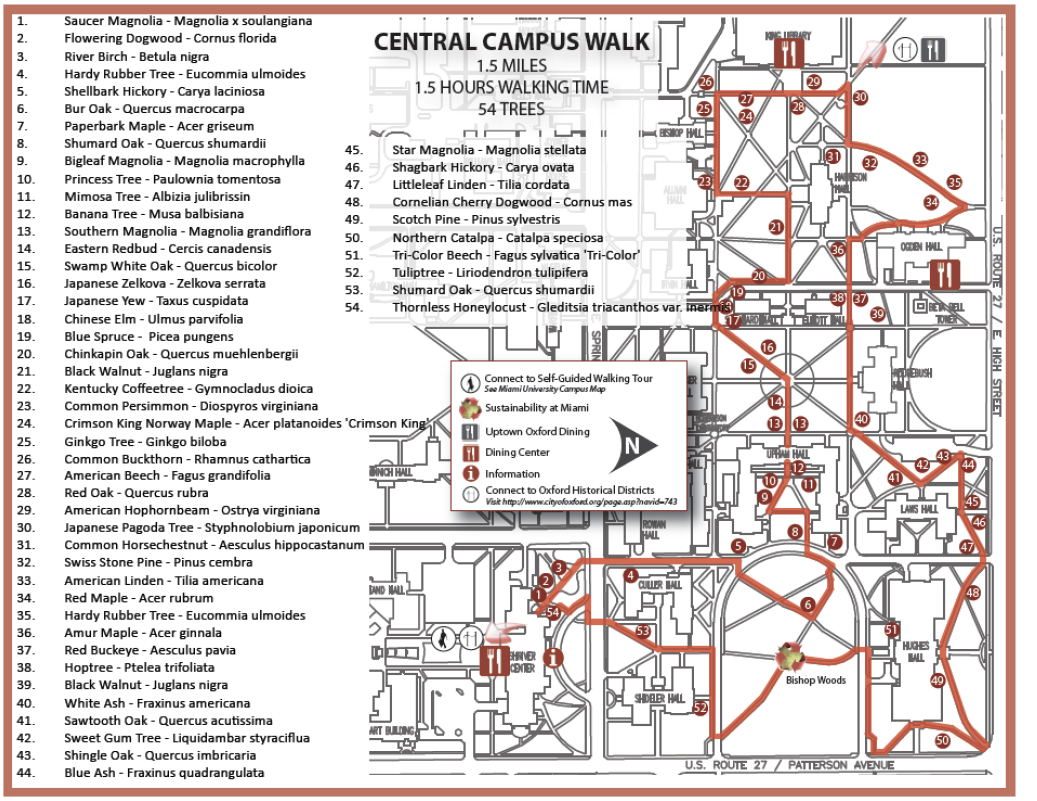

Figure 4.1

The Central Tree Walk map. Brochures containing all three maps were once given to campus visitors. Courtesy Miami University Dept. of Biology.

Figure 4.2

A label created for the original Tree Walk. Each post was installed next to the tree it was meant to highlight. Photo by Ginny Boehme.

The Tree Walks, as originally created and installed, were quite popular. The campus tree collection was of broad interest to campus visitors, was used extensively by various botany and ecology courses, and was a point of pride among campus physical facilities staff and landscape architects, aligning with an informal university tagline attributed to Robert Frost, "the most beautiful campus that ever there was." Unfortunately, the intervening years have not been kind to

the Tree Walks. Nearly 25 percent of the trees have been removed for various reasons (construction, senescence, infestation, etc.); the plastic number labels have degraded, making the printed maps irrelevant; and the exhibit in general has fallen into relative obscurity. Of equal importance is that, even at its peak, the Tree Walk did not align with current accessibility standards nor provide the most relevant or interesting information about the tree species and specimens to audiences.

As part of an initiative to highlight the "green" components of campus, led by Miami's Office for the Advancement of Research and Scholarship, the university's Hefner Museum had been tasked with determining how to best refresh the Tree Walk. As a functioning principle, everything the museum does includes students; thus, combining the Tree Walk refresh goal with a research-based service-learning course in the FYRE format was a natural fit and provided the opportunity and prioritization to dive into the task.

In designing and advertising this course, we challenged the traditional idea of research as a dry, stoic process best suited for those with highly analytical minds. We wanted to attract students from all disciplines, to synergize their interests, broaden their perspectives, inculcate a team-based ethic where a range of skills and knowledge were valued and applied, and increase their skills on both ends of the analytical-creative spectrum. Our course description in the catalog read

> Are you a creative student who wants to apply your skills in a scientific way? Perhaps you are a technical person looking for ways to communicate complex ideas to broad audiences. Do you love learning, creating, and story-telling? Diversity like this is necessary to create museum exhibits that engage and promote learning by people of all backgrounds. Our team of passionate students will learn how to distill research and write for different audiences, develop prototypes, adapt exhibit components for people of all abilities, and quantitatively test products. Then, we will create graphics, interactives, and other specialty components, and install the exhibit.

Our expectation was that most of the students who participated in this course would not be inclined toward research-heavy fields, so we designed the curriculum to focus on improving IL and writing skills that would be broadly applicable to all fields, with opportunities to focus on a specific discipline's methods. We tailored our lectures to focus on information and literature of relevance to the Tree Walk, while reinforcing that this general paradigm was intended to be applied to an exhibit of any sort. Accordingly, the second (2019–2020) cohort of the course included exercises on a second prospective project—a solar system model scaled to the size of our city—as a second case for consideration.

As can be expected, teaching methodology and subsequently guiding students in the application of that methodology necessitates a significantly longer schedule for completion of an exhibit than would typically be required. Additionally, the course was expected to accommodate student enrollment for both a single fall semester and as an option to continue for a second semester. Because of these scheduling considerations, we anticipated that a given cohort of students would not necessarily be able to be involved in the entire

exhibit process. We thus ensured that most assignments taught fundamental skills while also materially contributing to the completion of the project and that the data gathered and products created in one semester would provide the foundation for the next. For the instances where scheduling would prevent students from participating in a significant component of research or execution, we included mock-ups and lab practicums to at least give them exposure to those elements. For example, didactic design might happen in the first semester, while physical installation would happen in the second semester. As a result, first semester students would spend a day experimenting with different kinds of drill bits in plexiglass and different adhesives, while second semester students would be more likely to have a week of experience in this aspect as they installed signage, but would have shorter exposure to didactic design. This iterative approach also provided a path for the course to continue in further years to additional projects, including additional segments of the Tree Walk loops, as well as the solar system project and potentially collaboration with other campus museums.

The Assignments

The primary deliverable at the end of the first semester from each student was a set of museum-quality labels—one for each of the roughly twenty tree species they picked to research during this course. The label text was the most important piece of the exhibit, as it needed to be informative, interesting, and relevant to our audience; be factually accurate; and conform to the standards we set, which were based on a list of label-writing "commandments" set forth by Serrell (see appendix 4A).[5]

In order to ensure that our students were capable of creating these labels, they first had to learn how to locate, evaluate, synthesize, and communicate facts and other information from diverse sources. The students also received instruction on museological design: finding and defining the big idea; understanding, empathizing with, and designing for different audiences; and assessing the design through quantitative and qualitative formative and summative evaluations. The major assignments throughout the year were scaffolded and designed around teaching these skills.

The lecture materials and subsequent assignments that predominantly fell within the scope of museology or exhibit design were primarily led by Sullivan; the material and assignments that predominantly fell within the scope of IL and general research skills were primarily led by Boehme or Messner. However, all course instructors brought their own expertise and perspective to all class meetings, resulting in responsibilities having been largely evenly distributed.

Since we were able to scaffold information literacy throughout the course, many of the course materials incorporated more than one frame from the Association of College and Research Libraries (ACRL) *Framework for Information Literacy for Higher Education*;[6] we were ultimately able to address all six frames, albeit at differing levels. For some assignments (e.g., assignments 2 and 8, the annotated bibliographies), the application of the *Framework* was more obvious; for others (e.g., assignment 6, the press release), it was a more implicit connection that built upon other concepts that had already been discussed.

Assignment 1: Writing with Purpose

One of the first major concepts we focused on was the difference between learning to write and writing to learn (see appendix 4B). Doing so assisted with setting expectations for future assignments and establishing a baseline for current student writing skills or knowledge. Students were asked to read and briefly summarize a document that urged them to consider the purpose of writing assignments, particularly for those they had completed in high school. Did they fully understand why they were being asked to write? What claims were they making, and were those claims well supported? The document asked the students to consider the function their writing was fulfilling and to make sure the form matched that function. For example, the often-denigrated five-paragraph essay that many students have been exposed to is a form intended to teach students how to write, but it rarely fulfills any other function.[7] In contrast, the final deliverable of exhibit labels needed to convey significant amounts of information in twenty to fifty words. The purpose of this assignment was to show students that scientific writing and exhibit writing are very different from what they have experienced in a high school setting and to allow students to confront their own writing style and ability early on.

Assignment 2: Annotated Bibliography 1

Following a series of lectures and activities covering different aspects of IL, students were asked to find and annotate a minimum of three documents related to any organism of interest that utilizes trees. The documents to be included in the annotated bibliography needed to meet certain standards of credibility and authority. In addition, the students were asked to include in each annotation a brief summary of the source, as well as justification for the category it fell into. The documents required were as follows:

- one that is scholarly or peer-reviewed;
- one that is popular, but high quality and credible; and
- one that has significant credibility issues or bias.

The assignment provided the basis for a follow-up class discussion. Most of the students found sources that matched each of these standards and were able to accurately classify them. The true purpose of this assignment, however, was to dissect and discuss the students' source categorization justifications and to understand both author and reader bias. Many students (and even some faculty) fall into the trap of judging an article based primarily on the journal in which it was published. Having the opportunity early on to discuss the idea of "content versus container" as emblematic of the biases and assumptions we tend to bring to our own assessment of informational objects made it easier for the students to locate and properly evaluate the information they needed later in the semester.

Taking an in-depth look at the specific documents students selected also provided a good starting point for a conversation about primary and secondary sources in different fields of study. *Primary source* means something very different on the surface to a humanities student than it does to a student in the sciences, yet understanding how in actuality, these perceived differences in meaning are in actuality quite similar, is an important threshold concept, which often leads to interesting and thought-provoking discussions.

Assignment 3: Universal Design in Exhibits

Universal design (UD)—the design of a built environment so as to be accessible, understandable, and usable to the greatest extent and to the greatest range of people possible—is an important aspect of exhibit design.[8] For the museum exhibit project, we wanted to get our students thinking about this concept as early as possible.

After an introductory lecture on the principles of UD with examples of its application in museums, we asked students to showcase their creativity. Using the organism they had already researched for the first annotated bibliography as their topic, the students were asked to describe—in words, sketches, photos, or any other format they chose—two different ways in which they could present information that would achieve the principles of UD.

Many of the exhibit designs our students created were highly creative and informative and demonstrated a good understanding of the UD principles. However, since we did not limit them to a particular style or budget, many of the designs were outside the realm of what was possible for the Tree Walk exhibit (i.e., too expensive, too large, too dependent on a specific technology). This was not unexpected since we intentionally gave the students wide latitude to create whatever they envisioned. Discussions about these limitations gave us the opportunity to discuss the realities of budgetary issues, technological roadblocks, and other bureaucratic matters and allowed us to home in on what would be possible and feasible. This assignment and resultant discussion set the stage for the decision on what the redesigned exhibit would look like.

Assignment 4: The Big Idea and Writing the KUD

Museological design is in some ways quite similar to backward design for instruction. In the latter, best practices call for instructors to begin by laying out specific learning outcomes that detail what the students are expected to know, understand, and do at the end of the session. Exhibits are planned and designed in the same way, starting with the big idea that guides the development of the exhibit and with the development of the KUD document (what we want the audience to know, understand, and do). We wanted the students to participate in all aspects of the exhibit design and to give them ownership of this project, including writing the KUD.

Assignment 5: Label Writing Practice

Writing interpretive labels is both an art and a skill. In order for our students to be able to effectively write labels for the exhibit, they needed to practice. We started this process by touring an older extant exhibit. Its labels are very literate, authoritative, information-dense, and arguably interesting. However, they are also very long, averaging 200 words per label. Several studies have shown that shorter labels are more engaging for visitors, resulting in more time spent reading and more information retained.[9] Students immediately recognized length as a significant deterrent to reading, comprehension, and even interest in the exhibit context. They were asked to rewrite one label of their choice using thirty words or fewer. Each student subsequently presented the original label and their adaptation, and the class discussed the benefits and deficiencies of each version.

This assignment was also an informal formative evaluation, an element of the course that would take place quantitatively later in the semester.

Assignment 6: Press Release

Part of creating an exhibit is planning for its opening. Similarly, part of the research process is communicating to others about one's work in ways other than a final research product. For this assignment, the students drafted press releases based on expectations about the final exhibit. These press releases fulfilled pedagogical goals, and some of the wording in the releases also had the potential to be selected for incorporation into an official press release for the opening of the exhibits to the public. Press releases require a very different writing style than exhibit labels, allowing the students to practice writing a piece that was more closely aligned with other assignments they had been given in the past.

Assignment 7: Writing Survey Questions

Audience assessment is an important aspect of exhibit design. Prior to creating an exhibit, formative evaluations are used to assess content issues, such as existing knowledge and misconceptions of the audience, and other elements such as effective font and titling. Summative evaluations are then used to assess the effectiveness of the exhibit teams' products.

In order to conduct effective surveys, the theory and practice of survey research methodology must be understood. While survey instruments appear to be simple—with many people believing that they could conduct effective surveys without particular training—this subject alone could constitute its own university-level major. In the context of our class, we covered sufficient fundamental aspects of survey question writing, administration, and analysis to compose a fourteen-question formative evaluation.

As one of the assignments for the survey, students were asked to create a series of questions they thought would be useful in evaluating the exhibit. We then discussed the utility of the questions themselves in relation to our desired understanding and considered how questions might be combined to minimize the total number of questions on the survey in order to best maximize response rates. Time was also spent on question phrasing and how answers would be gathered (Likert scale, checkboxes, etc.).

Finally, the students received institutional review board (IRB) training to learn how to complete elements of the IRB submission documents. Such documentation and review are necessary for any research involving human subjects that may see future publication. Ultimately, this formative evaluation was administered to faculty, staff, and students across campus and to members of the Oxford community. Results were used by our class and were especially informative regarding needed label content. Some students later summarized the results in a research poster that was presented at Miami's Undergraduate Research Forum.

Assignment 8: Annotated Bibliography 2

The second annotated bibliography, which was to be turned in by the students at the end of the semester along with their final assignment, consisted of a collection of all of the

credible, appropriate resources the students consulted when writing the label text for each species of tree they were assigned. Given the diversity of disciplines represented by our students, we encouraged individuals to use the bibliographic format of their field. Extensive annotations were not required; rather, we recommended that the students utilize our "writing to learn" guidelines—to include as much or as little information as they found useful, in whatever format or style was most helpful to them, and copy and paste as necessary or useful. The goal was for the annotations to be useful and easy to generate, not polished works of original writing.

Assignment 9: Final Labels

The final assignment was the finalized label text for each of the tree species the students were assigned. This was an opportunity for the students to fully demonstrate all the skills they had learned throughout the course. The labels needed to be short (fewer than fifty words); be fully researched and factually accurate; fulfill the goals of the big idea and KUD; and be engaging. As there is both an art and a science to label writing, grading can be challenging. Such an assignment is "learning to write" (in contrast to the annotated bibliographies) and must thus be technically polished and free of both explicit and implicit plagiarism. Implicit plagiarism in this context could include the refining of a Wikipedia paragraph into a label. Additionally, the content of a label must be relevant to the audience; in this context, simple horticultural or phenological information would be insufficient. In the end, as with most beginners' art, few of the labels were perfect. However, most students were able to achieve technical success.

Final Exam

A fundamental goal of involving students of all disciplines in research is to help them become effective consumers of information and community leaders through effective use of that information. Throughout the semester, students spent considerable time accessing, assessing, and distilling peer-reviewed papers and other content-rich publications. For their final take-home exam, each student was expected to read two peer-reviewed scientific papers on the same subject that came to different conclusions; answer a series of questions about content, methodology, and conclusions; and then make and rationalize a decision about which paper was correct. The students were permitted to use any published resources to help them with their assessment. While this was an unusual final, it proved to be an effective assessment tool regarding learning outcomes from the course, and the distribution of grades conformed to those typically seen.

Overall Expectations and Challenges

For the most part, each of our students showed considerable progress in achieving the learning outcomes we set for them. As with any class, students get out of it what they put in; for the majority of our students, what was put in was an unmistakable amount of enthusiasm and effort. After the class had concluded, some of the students went on

to form a new university club, "No Trees, No Shade," centered around the appreciation of trees, and specifically the campus living tree collection. However, as alluded to above, many of the labels created, while technically correct and worth full or near-full credit based on the standards we set for the class, were not up to the standards we would set for a high-quality museum exhibit.

As for the information literacy and research competencies we hoped to instill, all students succeeded in building skill sets greater than we would normally expect to see from first-year students. While they did not become content experts, they vastly improved their ability to evaluate the credibility and authority of information. Many of them were able to track down some surprising sources, demonstrating an improvement in their ability to quickly find relevant information. In addition, several extra- and intra-curricular opportunities arose for our students to showcase their learning and research about different aspects of the exhibit, such as Miami's annual Undergraduate Research Forum.

Perhaps the greatest challenge of the course was finding the balance between teaching the research and writing skills necessary to reach the objectives of FYRE and teaching the students enough subject matter to fully understand the content of the resources they found. We tried to take this deficiency into account by teaching the students to start with tertiary and secondary resources aimed at nonexperts and then confirm the information by tracking down the primary sources from which the basic material was written. Due to the increased amount of time this approach is likely to take, it is important—both as the instructor and for the sake of the students—to set realistic expectations for the products generated by the end of the course. It is unreasonable to expect to accomplish all of the tasks necessary to create a museum-quality exhibit in one semester. However, it is possible to provide a quality research-based experience that will engage and edify students of any discipline.

Conclusion

Ultimately, this course has proven to be a success. The majority of students performed exceptionally well, and many have gone on to utilize not only the research skills they learned during the course but also the specific content they researched. Our last cohort of students was so invested in the success of the project that they spent personal time and effort to successfully apply for a grant that accelerated the completion date of the exhibit. Since this is their grant award, they have, in effect, become principal investigators of a project that they will need to complete in addition to their regular coursework. As instructors, although this means a little more work for us in the coming semester, we take great pride in such immediate student success, for it demonstrates the effectiveness and value of involving students from diverse backgrounds in authentic research.

APPENDIX 4A
The "Ten Commandments" of Writing Interpretive Labels

1. Labels should begin with concrete, visual references to the objects they interpret to bring them to life.
2. Labels should relate to the big idea of the exhibit, not ramble without focus or objectives or contain sub-sub-subtopics.
3. Labels should emphasize interpretation (offering provocation) over instruction (presenting information).
4. Label writers should know their audience and labels should address visitors' prior knowledge, interests, and/or misconceptions.
5. Questions asked in labels should be visitors' questions.
6. Label design should reflect the label's content or context and have a recognizable system of organization of label types.
7. Labels should be written with a vocabulary that is within reach of the majority of visitors.
8. Labels should be short and concise, more like a tweet than a tome.
9. Labels for interactives should have instructions or interpretations integrated in logical, intuitive ways.
10. The typography (typefaces, sizes, design, colors, lighting, materials, and placement) should make the labels legible and easy on the eyes, not busy or distracting.

APPENDIX 4B
"Learning to Write" versus "Writing to Learn"

Briefly defined, "learning to write" focuses on the fundamental mechanics of writing, from punctuation to the successful conveyance of ideas. It also includes lack of plagiarism and should lead to pleasant-to-read prose.

In contrast, "writing to learn" focuses on gathering knowledge and formulating ideas. It leads to intellectual development and scaffolding of those ideas in a discipline-appropriate structure but, at this stage, may include content from any sources, copied-and-pasted paragraphs (identified as such), and tangential ideas. Importantly—especially to students being graded—writing to learn products are not evaluated by length or grammatical integrity but rather by the utility of the information gathered and clarity of the ideas presented.

Eventually, the pedantic aspects of writing are evaluated. In our class we also graded the efficiency of prose and appropriate voice.

In this way, a writing assignment is not a mere reflection of the student's ability to follow conventions of writing, but a strategy that promotes metacognitive growth and cross-disciplinary learning. It can also reveal to the instructor the student's current level of sophistication in research and thinking skills.

Further Reading

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