

Digging In and Branching Out: Collaborative Processes of Building, Embedding, and Evolving Online Interactive Learning Modules for Library Instruction

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Disclosure Statement: The author has no conflicts of interest to disclose.

Journal of Library & Information Services in Distance Learning

Submitted March 31, 2022

Accepted June 10, 2022

Published Online June 23, 2022

Published version: <https://doi.org/10.1080/1533290X.2021.1942387>

Citation for published version:

Ezell, J. (2021) Digging In and Branching Out: Collaborative Processes of Building, Embedding, and Evolving Online Interactive Learning Modules for Library Instruction, *Journal of Library & Information Services in Distance Learning*, 15:2, 129-141, DOI: [10.1080/1533290X.2021.1942387](https://doi.org/10.1080/1533290X.2021.1942387)

Digging In and Branching Out: Collaborative Processes of Building, Embedding, and Evolving Online Interactive Learning Modules for Library Instruction

This case study reflects on a long-term collaborative partnership between librarians and writing program administrators to plan, build, implement, and significantly revise two course-specific online learning modules. Of particular interest are contrasts between phase-delineated instructional systems design frameworks, such as ADDIE, and the often recursive, unpredictable, and messy paths of project development in practice. In describing the evolving uses of the modules within an ecosystem of programmatic library instruction, this study also demonstrates the utility of flexible, iterative, and organic approaches in evaluating, revising, and repurposing instructional design projects to meet unforeseen challenges and opportunities in an academic libraries context.

Keywords: instructional design; learning modules; collaboration; library instruction; ADDIE; COVID-19

Introduction

Many academic libraries have faced demands to reach ever larger numbers of students, often without a corresponding increase in librarians and staff. This phenomenon can make online asynchronous content the most scalable and sustainable means of embedding librarianship across constituent courses and disciplines (Moran & Mulvihill, 2017). However, creating and maintaining digital learning objects is a considerable investment of time and resources. The current case study describes the development, deployment, and revision of interactive information literacy learning modules built by a team of librarians partnering with the First-Year Writing Program of the English Department at a large public university in the Southeastern United States. This collaboration began at the process of course design and timed the core concepts and information literacy objectives from the Libraries' content with themes and assignments

in the course syllabus. This project began as a means of reaching online-only course sections in a way equitable to their face-to-face analogues, but its scope and impact evolved significantly over its first three-year deployment, and ever more so during 2020's COVID-19 crises.

Context for Collaboration

The background for this project was a broader collaboration between the English department's First-Year Writing (FYW) Program and librarians at a large Southeastern public university, which enrolls about 38000 students, with approximately 7000 first-year, first-time students annually. Nearly all undergraduates must complete the FYW Program's composition course, EN102. Around 225 sections of this course are offered each semester, about 10 percent of which are offered as online-only remote courses. The Libraries' instruction program has cultivated a strong relationship with the FYW program, allowing librarians to have active presences in the EN102 classroom. For each course section, librarians teach two to three sessions from a structured set of lesson plans, and upload online components such as tutorials and LibGuides into the campus learning management system (LMS; Blackboard Learn).

However, the Libraries' presence did not extend to this degree for the distance students in approximately 20-25 online-only sections of FYW courses each semester. These sections were provided links to online resources (LibGuides, video tutorials, podcasts) and contact information for scheduling consultations or requesting help. These elements were helpful, according to FYW program administrators, but there was a clear disparity between the support provided for EN102 Online compared to classroom-based sections of the course. While the EN102 Online course itself was undergoing planned revisions for fall 2017, the Libraries' Instruction Coordinator and Instructional Design Librarian built two interactive online learning modules via a

partnership with an FYW program administrator, who served as the project lead for the overall redesign of EN102 Online. The development and implementation processes for these digital learning objects, detailed in this article, were initially completed in fall 2017.

This partnership would be revisited during a scheduled revision and redesign of both EN102 Online and the Libraries' modules in 2020, which saw contexts for use change as the line between in-person and online instruction disappeared. During this time, instruction librarians partnered with classes online, seeking to meet the varying needs of instructors and students. Recognition of the increased need for flexibility and reusability guided many of our priorities for the revision and redevelopment process.

Literature Review – Defining Scope of Partnership and Project

Early in the project, the nature of this partnership was still to be determined. Lo and Dale (2009) described a successful collaboration between a subject librarian and an instructional design librarian that played to their complementary strengths; the instructional design librarian guided the development of new content, informed by the subject expertise and program proximity of the subject specialist. In our case, a similar division of labor and expertise was the intuitive approach at first.

How the modules and librarians would integrate with and embed into the course was the more pressing question. Researchers and practitioners writing about the processes and products of embedded librarianship have described differing degrees of embeddedness as a function of depth or level (e.g., Allen, 2017), and others have differentiated between projects at the level of scale (e.g., micro- or macro-level embedding; Olesova & Melville, 2017). Olesova and Melville (2017) identified micro- and macro- levels of embedded librarianship, based on the degree of involvement for the individual librarian. In regards to content creation, at the macro-level, embedded

content may be simply curated or repurposed general tutorial content, while at the micro-level, librarians meet directly with course instructors and develop specific and customized learning goals and instructional content for the research components of a particular class or discipline (Olesova & Melville, 2017, p. 289).

Allen (2017) conceptualized three levels of embeddedness, with examples of each forming loose criteria in terms of content use and development. At the lowest level, general messages, links, and contact information might be included in a course; towards the mid and high levels, specific content is created for courses, assignments, and even integrated into programs of study (Allen, 2017).

The different instructional and institutional contexts where librarians work in online embedded models can make the idiosyncrasies of individual programs as apparent as the commonalities across programs or institutions. The concept, in the offline sense, takes many forms (Dewey, 2004) and this diversity is also apparent in online practice (Tumbleson & Burke, 2013, p. 70). It is in this sense that Tumbleson and Burke (2013) generalize that online and hybrid “[e]mbedded librarianship means getting into the LMS, gaining access to a course’s classroom or site, and offering assistance to students” (p. 16). However, as Johns and Oestreich (2019) described, faculty and program administrators do not always have the desire or ability to grant librarians full access to courses in the LMS, but librarians can work around these barriers to provide a system of synchronous and asynchronous support with considerable creativity and coordination.

The present case study draws on many commonalities between these definitions and descriptions of online embeddedness; we worked to foster a collaborative relationship between the stakeholders, actively participated in the design of information literacy components in the larger course, built LMS-embedded learning modules and

activities customized for the course concepts and timing of the assignments, and continued to revisit and evolve our online modules as the needs of users and of the larger learning community at the university changed.

Our goal was to create asynchronous information literacy instruction that was, in terms of content and intended learning outcomes, equivalent to classroom instruction sessions. The project therefore involved significant development of course-specific content from the ground up, akin to “micro-“ level embedding (Olesova & Melville, 2017). Although the English liaison included an introductory message and contact information in the LMS, the modules were designed to function with no further direct participation from a librarian.

Scalability and reusability were also key concerns. We did not want to rely on participation from individual librarians in course sections (e.g., via discussion board posts, assignment feedback) as any increase in scale would increase staffing commitment. In the initial deployment for the 20-25 sections of EN102 Online, the labor of providing individualized feedback for the worksheets and activities we developed would be the responsibility of individual course instructors. Synchronicity of the libraries’ content with the syllabus helped instructors review and respond to information literacy outcomes in the context of larger assignments and projects. This approach of leveraging the instructor of record is similar to one described in a case study by Faulk (2018), and it served to mitigate the dilemma of scalability vs. personalization without placing additional requirements on librarians’ time. In anticipation of future use by classroom sections of EN102, we recognized that the approximately 100 FYW instructors would have diverse preferences regarding LMS access for partnering instruction librarians. In a way similar to the ‘halo’ system of library support described by Johns and Oestreich (2019), these modules could function

as core elements in a broader instructional and support ecosystem provided by the libraries. As such, they provided a baseline of skills- and resource-oriented asynchronous instruction that could be incorporated into various instructional strategies based on the needs of the class and various pedagogical approaches and lesson plans of instruction librarians (e.g., for flipped pedagogy; as prerequisites to individual research consultations; as just-in-time reference resources).

Analysis, Design, and Development in Contextual Practice

At the start of this project, we decided to adhere to two traditional characteristics of instructional design process and practice. We initially adopted a generalized ADDIE (Analyze, Develop, Design, Implement, Evaluate) approach for instructional design and we divided labor between subject matter experts (the FYW project lead and the Libraries' Instruction Coordinator) and an instructional designer (the Instructional Design Librarian).

Briefly, ADDIE is a conceptual framework for a systematic approach to instructional systems design, based on five key processes: analyzing learners and the learning contexts; designing instructional goals, strategies, and evaluation; developing and validating instructional content; implementing and deploying the product for learners to use; evaluating the quality and effectiveness of the instruction. Evaluation and analysis guide revision cycles, beginning the process again. The ADDIE framework is a widely used means of schematizing core components of instructional systems design, and it serves as a foundation for many more specific instructional design process models that elaborate on the relationships between these components (Gustafson & Branch, 2002). As a generic framework, ADDIE is also frequently utilized for planning and producing web-based instructional design projects in libraries (Farmer, 2011, p. 16; Tumbleson & Burke, 2013). As (Molenda, 2015) argued, there is a common

understanding of ADDIE as a set of sequential phases that can also be navigated and revisited iteratively, and it was in this sense that we initially approached the project.

Analysis and Planning

Because the FYW project lead and the Libraries' team had between them years of experience with the intended audience—as instructors, instruction librarians, and program administrators—the Libraries' team did not perform a formal needs assessment of learners. Through multiple brainstorming sessions we outlined the needs of the target audience, sketched out desired learning outcomes and skills, and worked to synchronize the placement and timing of the Libraries' components within the syllabus.

The EN102 Online syllabus consisted of four units which scaffolded key concepts and tasks in the research process. We determined that the Libraries' contributions would be the most effective in the first two units: Textual Analysis and Annotated Bibliography. Our involvement began during the course outline process, and we built at points in these units identified by the FYW project lead. The learning objectives at these points aligned with information literacy concepts and skills that the Libraries' instruction program had taught for years, and the assignments at the end of the first two units (a textual analysis paper and an annotated bibliography) provided students with immediate, real-world projects where these concepts and skills could be applied.

We had a good idea of where to cover specific concepts and skills, and this was further guided by survey feedback from the cohort of FYW Online instructors. Strategies for evaluating sources for credibility and concepts and conventions regarding ethical use of sources were prioritized for the Analyzing Texts unit, while search strategies and concepts such as keyword selection, topic identification, and database searching were assigned to the Annotated Bibliography unit.

Design and Development

As we outlined content and sketched ideas for activities and interactions via shared cloud documents, we also deliberated on several crucial design choices that informed our process and tool selection. We determined that the modules must: be embedded within the course shell in our LMS, automatically report to the course gradebook, function asynchronously and without involvement of a librarian, be relevant and functional for a three-year life cycle, meet accessibility requirements and best practices, facilitate multimodal learning and multimedia interactivity, be technically and financially achievable by our team, and be finalized and deployed by a fixed deadline. These were not our only agreed-upon requirements or preferences, but these were prerequisite to further development.

We tried several content authoring tools as we moved from draft documents to a functioning prototype. After testing Articulate Storyline 360 and Adobe Captivate 9, we opted for a relatively new tool, Articulate Rise. This cloud-based software used a simple, in-browser interface, so edits and reviews could be made by any machine with internet access. Design and content options were very limited but elegant, and a web-savvy user could prototype a course and export it as an embeddable SCORM object quickly.

Designing with Rise allowed us to bridge a gap between our respective roles in this project. Both librarians began performing the work of instructional designer and subject matter expert, as the software allowed us to develop assets, assessments, scenarios, and revise or expand upon the work of one another. This workflow also accelerated the review and versioning process with the FYW project lead, who could provide feedback and suggestions quickly and conveniently.

The project began with a generalized, somewhat flexible interpretation of ADDIE that assumed—at least as a conceptual or idealized framework (Boling et al., 2011)—a degree of phase-delineation and sequential progression. However, our team dynamics, software, and evolving workflow allowed for us to draft, develop, test, troubleshoot, and revise as a continual, collaborative, and concurrent set of processes, rather than discrete steps. This increasingly iterative process evolved to resemble rapid prototyping (e.g., Nixon & Lee, 2001), in that models were progressively refined in cycles as we worked toward implementing a high-fidelity, completed product.

We interpreted this drift from our initial process model and team roles as an appropriate series of responses to situational and organizational contexts, rather than an indicator of failure in our planning or development processes. Frameworks and process models for instructional design are simplified so that, among other reasons, they can allow for communication about the design process (e.g., Ni & Branch, 2008; Smith & Ragan, 1999, p. 7) and aid designers to conceptualize and visualize how a project will be approached (Gustafson & Branch, 2002, p.1.). The contrast between a simplified conceptual framework for systematic instructional design and the messy reality of design and development in practice has appeared in numerous studies of instructional design professionals (e.g., Boling et al., 2011; Visscher-Voerman & Gustafson, 2004), who must adhere to budget and time constraints and may rely more on design judgment and heuristics derived from experience than prescriptive models.

After testing prototypes of the nearly completed modules in the LMS, the course's instructional designer informed us of a serious problem. Our content from Rise failed several key tests for accessibility and ADA compliance, and these were the result of inherent and unchangeable problems in the software. Having assumed that the simplicity of Rise meant its content would be accessible, we were surprised to discover

that its interactions were inaccessible, alt-text fields were unavailable, and the course was not keyboard navigable.

Abandoning this rapid authoring tool in favor of Storyline 360—which can create accessible content with some tweaking—we quickly migrated and expanded upon content from Rise, this time with accessibility as a foundational objective. This required a considerable degree of customization, workarounds, and flexible thinking, and no interactive or multimedia element was created without first understanding how it could be made accessible.

Moving to Storyline 360 allowed for modules that were more creative, engaging, and allowed us to build content that meaningfully aligned with our learning objectives. Although the development pace had shifted to an emergency sprint as we shifted software packages, we still pursued opportunities for creativity.

First, we included and expanded upon key concepts and focused on addressing learning objectives that we were not able to meet using Rise, because of its then limitations on types of interactions, navigational structure, and visual elements. Second, and more significantly, we were able to present and chunk content in linear, multilinear, and open navigational designs as appropriate.

The first module was designed to be self-paced, and the content was broken into a predominantly linear presentation at the section level, with many subsections conceptually chunked onto single slides that used open tab navigation to display examples or individual concepts. For instance, a subsection introducing the concept of citation was chunked into four tabs (“why we cite”, “how readers 'read' citations”, “what to cite”, “how to cite”) which could be viewed in any sequence and remain coherent. This design format also reinforced the contextual relationships between specific

information chunks in each subsection and within the broader topic of the section or module.

The more elaborate second module—Conducting Research—was divided into two main sections: self-paced interactive tutorials and video tutorials. The interactive section focused on beginning a project, narrowing a topic, and defining search terms and tools, while the video section consisted of four database-specific videos and a walkthrough of common strategies for database searching. Most instructors required students view only a subset of these videos, so this section was designed with an open navigation menu and a flexible reporting system that accounted for the different ways content might be used. In both sections of the module, we used examples that highlighted features of our Libraries' website, its integrated search layer, and various resources. Screenshots of database searches and results pages were selected to introduce students to the diverse range of source types available to them, and to familiarize students with the interfaces of several major publishers. For example, comparing keyword search results for “sugar-sweetened beverage” (which returns more academic research articles than news articles) in Academic Search Premier and ProQuest Newspapers introduces these resources while illustrating several key concepts for search strategy and tool selection.

We aimed for a pedagogical approach that fostered metacognition and reflection, but we had to balance this within the limits imposed by asynchronous delivery, the technical constraints of our platform and authoring tools, and a recognition of the role the Libraries' modules played in the context of the entire course. Therefore, much of the textual content was organized as problem-posing, using demonstrative examples of principles, concepts, and skills in a way intended to encourage metacognitive and metaliterate understandings of how they might be applied. Interactive and animated

elements helped to demonstrate processes or allow students a degree of rehearsal and exploration in applying concepts to their research topics.

Evaluation, Feedback, and Assessment

A cornerstone of instructional design practice is the process of evaluating projects during all phases of development and at regular intervals after it has been published. Criteria vary depending on the project. For online interactive modules, it's critical to ensure functionality, assess quality and appropriateness of the materials, solicit feedback from students and instructors, and, most importantly, determine if the product, in its current state, is helping learners accomplish the stated learning goals. These considerations guide revisions and inform future best practices.

Our narrow development window and various technical limitations sent several key processes of development and implementation to triage. A rushed summative evaluation missed several minor functional and content issues (as content creation continued beyond the development phase). We prioritized auditing accessibility over more general pre-deployment usability testing—the early semesters of usage became our de facto pilot tests. After launch we performed more thorough testing and addressed feedback from instructors and students, resolving several minor issues during the interim between the first and second semesters.

A major, unresolved shortcoming of the learning objects we developed was that we were unable to create a reliable system for automatically reporting usage information or the status of learning outcomes from the LMS back to us. It was not an out-of-the-box possibility based on the construction of our learning objects (gradebook-integrated SCORM objects) and the administrative settings of our campus LMS.

We had no access to the gradebook information for the dozens of course sections embedding our modules and no direct interactions with the students in the online

sections of the course. Measuring changes before and after instruction and being able to incentivize completion of these measurements can be straightforward for an instructor. These actions are more difficult for librarians who are using online learning modules rather than directly interacting with students. We were thus unable to directly gauge the efficacy of instruction, despite our efforts to align our content with the progression of the course.

Our learner-oriented evaluations had to be conducted more obliquely. We could not see how many people completed our modules, but we could estimate this by analyzing usage statistics for embedded streaming videos (which were only linked within the modules). We also received information on usage and student opinion via anonymized survey responses shared with us by the FYW program after three semesters of implementation. The sample represented students from 15 sections ($n = 317$) of the course, with subsets responding to questions regarding the library modules. Of students who responded regarding use ($n = 274$), 72 percent ($n = 196$) consulted the modules at least once per unit in the four-unit semester and 37 percent ($n = 102$) did so three times or more per unit. Students also rated how helpful the modules were for completing their projects, with 82 percent ($n = 173$) rating them as either “moderately” or “very” helpful (only 3 respondents rated the modules as “not helpful”). Although incomplete and imperfect, this data implies that students were engaging with the content we developed.

Informal feedback from instructors and writing program administrators indicated that students were referencing content and concepts from the modules in course discussion threads. Compared to previous semesters, there was a reported improvement in online students’ ability to use library resources, determine source relevance and reliability, and cite sources appropriately. The response from FYW administrators was overwhelmingly positive, and after the first year of deployment, the

modules were installed in the course shell for a large percentage of EN102 classroom sections. We also received requests from individual classroom instructors, and in response shared the module files and installation documentation with the FYW program so that interested instructors could conveniently implement them. It should be noted that in these classroom sections of EN102, instruction librarians also actively partnered with instructors, who often assigned the modules as homework prior to instruction sessions. This enabled librarians to flip the classroom, hold Q & A sessions, workshops, or try other instructional strategies in their time with students. The Libraries' typical three-session instructional series could be condensed into fewer visits, and this freed librarians to increase engagement with their specific subject areas, or to partner with a larger number of sections. For a program where a fixed number of librarians serve an expanding student body, these asynchronous components functioned as a force multiplier and improved the sustainability of our instruction efforts with the FYW program and across the disciplines.

Conclusion: Iterative Redesign in the Year of COVID-19

Designing, developing, and implementing custom-built interactive content as part of an instructional ecosystem requires significant time, effort, and expertise. Nevertheless, the project impacted thousands of students during the first three years of deployment, and this justified further commitment to revise and update the modules for the next three-year-period.

These revisions were approached iteratively—areas in need of improvement were prioritized, and lower-priority issues were to be addressed in future revision cycles. We identified several key priorities: mechanisms for assessing student learning outcomes and interactions within the modules; connecting these data to the Libraries' existing assessment efforts for FYW; improving navigation, accessibility, and quality of

life features; overhauling and standardizing visual design; updating and revising textual content and links where appropriate.

An analysis guiding the redesign process, along with concurrent development of prioritized revisions, was underway when the COVID-19 pandemic reached the United States and upended higher education across the country. Planning a fall 2020 rollout, we predicted an increase in the number of (former) classroom instructors using the libraries' modules, as well as a compressed timeline for campus instructional designers. We rushed to make the all prioritized changes, create documentation, and thoroughly test the modules for functionality. This also involved an active partnership with the instructional designer responsible for revising the EN102 course shell, as accessibility and functionality within the LMS needed to be confirmed.

The COVID-19 pandemic did not significantly influence the content of our redesigns, but it created instructional circumstances which guided us toward specific priorities. Assuming it would be embedded in more course sections, we emphasized ease of use and navigational signposting to avoid technical support problems from students and instructors. This included a dedicated "Help" section with various points of contact and development information for students and instructors, clear instructions for operation and navigation throughout the modules, a menu tab with an open content outline and keyword search functions, mobile-friendly design, and a resources tab with links, files, and accessible transcripts. At a later request from a FYW program administrator, we also developed a hosted version of the modules available via the Libraries' website, for instructors who did not want to deploy the modules into their Blackboard Learn courses as SCORM objects.

Assessing the effectiveness of the learning modules in the larger learning ecosystem of first-year writing was our other key priority, and the stresses placed on

students, instructors, and librarians during the pandemic made the need even more apparent. Using a linked Qualtrics form within the learning modules allowed for various points of usage data to be reported back to us from inside Blackboard, and this form also contained questions to allow for qualitative and quantitative assessments of learning outcomes and user experience. The Libraries' heads of instruction and assessment had previously developed and validated entrance and exit surveys measuring the semester-long progression of students across several information literacy outcomes (Walker & Whitver, 2020). With some coordination, we aligned the items in the module-based assessments to those in the pre- and post- tests, so that three time-specific assessments could be used to triangulate data. This coordinated approach to assessment is expected to provide many points of comparison and analysis at student, course, and programmatic levels. It may also offer some insights regarding how student learning was impacted by the events of 2020 and 2021.

Rolling out the updates for the first major redesign cycle highlighted a way that significant instructional design projects and partnerships may be conceptualized. For technological reasons, digital learning objects must function as discrete and concrete entities. But the processes that go into creating, maintaining, and implementing instructional design projects are often interconnected, fluid, and benefit from a balance of rigid planning and improvisational flexibility. Approaching such projects and partnerships as organic and iterative is a means of fostering continued relevance, operability, and impact in the face of change that is inevitable and at times unpredictable.

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