Enhancing Student Learning Outcomes: A Library and Writing Center Partnership

Mr. Samuel R. Putnam, University of Florida

Samuel R. Putnam, MLS, is an Engineering Librarian at the University of Florida. His research interests include engineering education, library instruction, technology in libraries, and information-seeking behavior in STEM.

Mrs. Amy G. Buhler, University of Florida

Amy G. Buhler is Associate Chair and Engineering Librarian at University of Florida's Marston Science Library. She started this position in November 2007. Amy handles collection management, library instruction, literature search assistance, and faculty/staff consultations in the areas of Agricultural & Biological Engineering and Biomedical Engineering. Prior to her work at Marston, Amy was a medical librarian for six years at the University of Florida Health Science Center Libraries where she worked with the College of Dentistry as well as the Departments of Surgery and Neurosurgery. Amy holds a Master of Science in Library Science from the University of North Carolina at Chapel Hill and a Bachelor of Arts from the University of Florida. Her research interests consist of assessment of information seeking behaviors, library instruction, and the marketing and outreach of library services.

Caroline Reed, University of Florida
Ms. Jean L Bossart P.E., University of Florida

Jean Bossart is an Associate Engineering Librarian at the University of Florida (UF). Ms. Bossart assists students with research, data support, and citation management. In addition, she investigates and integrates creative technologies, such as 3D printing into the STEM discipline library services. She has a BS in chemical engineering and MS in environmental engineering from UF, over 20 years of experience in industry and consulting, and is a licensed professional engineer in Florida.

Dr. Neelam Bharti
Dr. Mickey S. Schafer, University of Florida

lapsed linguist teaching discipline-specific prose

Enhancing Student Learning Outcomes:

A Library and University Writing Program Partnership

Introduction

In 2005, librarians at the Marston Science Library (MSL) began offering one-time library instruction for *ENC 3246: Professional Communication for Engineers*. ENC 3246 is a required course with approximately 25 traditional sections a semester and 2 large-enrollment online sections (see Appendix 1). All 5,800 undergraduate engineering students enroll at some point during their academic career. The principal goal of ENC 3246 is to prepare engineering majors to communicate effectively in their fields by emphasizing the literacy skills employed in professional decision-making. Over time, library sessions evolved to better meet the needs of the course through the incorporation of tools that would assist students virtually and at the point of need. In 2010, librarians on-boarded a research guide, via LibGuides, to provide continuity across sections and easy access to the resources discussed in face-to-face sessions. In 2014, short video tutorials were also created when this course began offering sections online.

The large, asynchronous online class revealed areas in course design that failed to translate successfully from the traditional classroom to a digital platform, particularly in the area of information literacy. In 2017, a team of five librarians entered into a partnership with the University Writing Program (UWP) to improve information literacy and lifelong learning amongst undergraduate engineering students in ENC3246. This collaboration is motivated by three goals:

1. Better align course literacy instruction with ABET criterion [1]
2. Customize library instruction to meet student needs with regards to particular assignments
3. Provide instructional coherence across all sections to support less experienced UWP teachers.

In doing so, the library and the writing program work together to meet the needs of students as future practicing engineers, help the College of Engineering maintain accreditation, and support the university's teaching mission.

Literature Review

The American Library Association [2] defines engineering information literacy as "a set of abilities to identify the need for information, procure the information, evaluate the information and subsequently revise the strategy for obtaining the information, to use the information and to use it in an ethical and legal manner, and to engage in lifelong learning." Engineering students often have difficulty finding and evaluating resources. Hanlan and Ziino [3] found that first-year engineering students lacked skills to conduct a proper literature search and could not locate appropriate references for constructing prototype devices. They also found that engineering students lacked the ability to judge the quality of cited sources and were relying almost predominantly on web based searches. Palmer and Tucker [4] found that undergraduate students had difficulty in citing complex reference types, such as book chapters and conference proceedings. However, Roberts and Bhatt [5] and Barsky, Read, and Greenwood [6] found an

increase in students' awareness and reported use of the library's information resources and services when the librarians collaborated with course instructors to integrate library instruction directly into required courses. Some librarians have even begun using the flipped classroom approach for information literacy instruction.

The concept of flipped teaching has been used in the humanities and social sciences for many years and has recently begun to be adopted by information literacy instructors. Flipped classrooms are also being implemented for a wide variety of engineering subjects. Maddison *et al*. [7] found that for instructors and librarians, the flipped classroom relies on active learning principles such as the sharing of information and peer-to-peer learning. Studies have shown that student engagement increases due to their participation in active learning activities. From a survey of the research, Kerr [8] found that the overall response to flipped classrooms has been positive at all levels from first-year to final year students. Flipped classrooms have shown an increase in problem-solving skills, conceptual understanding, and student retention rates. Maddison [9] found that smaller classes taught in computer labs (as opposed to large lecture halls) further enhanced student engagement in the flipped classroom model.

Our project expands upon the concepts presented in the current literature through offering novel approaches to collaboration with stakeholders, structure of research guides, and delivery of engineering information literacy instruction.

The Collaboration

To achieve the goals, we targeted student learning outcomes as defined in the ABET General Criterion 3 [1] by upgrading research assistance, mapping library resources to the curriculum, and changing the approach to library instruction. The team consisted of five MSL librarians and two UWP instructors, including the course coordinator, who met once a week to craft various components of the course's curriculum beginning in late spring 2017 through fall 2017. During these meetings, the librarians provided feedback on the new assignments created by the course coordinator, while UWP instructors were able to provide feedback on library instruction and resources.

The main outcomes of this collaborative project include:

- Redesigning the library guide for the course to cater to the specific research needs of certain assignments
    - Developing a credible source checklist to help students assess the quality of information they encounter in their research
    - Designing material for a new Failure Analysis Project that emphasizes identifying, formulating, and solving engineering problems as well as understanding professional and ethical responsibility
- Piloting two sections of a flipped classroom approach of information literacy instruction for deployment across all sections, traditional and online. This pilot included:
    - Creating a series of information literacy videos on understanding important engineering subjects such as scholarly and professional literature, standards, and patents

- Implementing active learning curriculum focused on information literacy via 5 25-minute sessions strategically planned throughout the semester
- Developing an assessment instrument to gauge the impacts on student learning outcomes of flipped versus traditional one-shot instruction.

The task was conceptualized broadly as "redesigning the research guide" and "piloting a flipped classroom". A redesigned research guide provides instructional coherence to teachers and support to students in all formats of ENC 3246. The flipped classroom experience will first serve instructors in traditional classrooms, while providing a model for online-class specific activities that can be performed by individuals or student groups. The team of librarians and instructors deployed these components over the span of 3 semesters, beginning in summer 2017 and ending in spring 2018.

Redesigning the Research Guide

The 2010 research guide for this course was primarily topic-based and provided general information about engineering library resources. The 2017 research guide introduces specific tools that students need for four individual assignments and two group assignments. In the interest of clarity for the user, the guide does not include specific resources for all assignments that occur throughout the semester. Instead, the team identified the best candidates for bibliographic instruction relative to timing during the semester, the knowledge practices needed to complete an assignment, and skills needed across the entire course (see Appendix 2). For example, the course coordinator had identified poor student performance in using credible sources as a major problem, so identifying sources and assessing credibility is emphasized throughout the redesigned Research Guide.

Tabs were created for individual assignments as follows:

- *Review of an engineering application*. In this assignment, students write a memo describing a web application useful to engineers, such as MathPad or Wind Tunnel for iPad. The associated tab in the research guide includes information on citing sources in IEEE style, specifically how to cite a screenshot and how to cite a figure from an article. The guide also provides an introduction to trade publications and links to some of engineering's most popular ones.
- ∉ *Job application packet*. In this assignment, students prepare a cover letter and resume in response to an internship for which they are qualified. Examples of each are provided in the research guide along with helpful links to professional organizations for each of the engineering disciplines.
- ∉ *Annotated bibliography*. The definition of annotations and annotated bibliography are listed to assist students with this assignment. Also included is a credibility questionnaire based on the CARS credibility model [10]. It also includes a link to a citation management tool (RefWorks). The Annotated Bibliography is a support assignment for the Failure Analysis Project.
- ∉ *Failure analysis*. For this assignment, students identify an engineering failure in their area of specialization and write a well-researched suggestion for a successful second attempt at the process. Use of standards is the main focus for this assignment. Examples of local, national, and international association standards are discussed and links to these resources are provided. This project includes an annotated bibliography and a document design analysis paper.

Tabs were created for the two group assignments:

- *Formal research report*. Working in a small group, students establish a research question, devise a method discover and collect the data. Individually, students write a research report that presents and analyzes the data collected as a group. The resources included in the research guide for the group assignment are definitions and differences between a) research articles, b) peer-reviewed (or refereed) articles, c) review articles, d) technical reports, e) conference papers, and f) trade publications. Also included in the research guide are links to science databases such as Compendex, Science Direct, Academic Search Premier, ProQuest Science & Technology, IEEExplore, INSPEC, and Web of Science. Links to websites where students can download technical reports are provided for NASA, Science.gov, the National Technical Reports Library, and other government and private organizations.
- *Proposal or grant application*. For this assignment students craft a proposal that seeks to persuade a target audience that a significant problem exists and offer a feasible solution. The tab in the research guide for this group assignment includes real-world engineering applications such as the UF Strategic Development Plan, a guide on writing winning NSF graduate research fellowship applications, and an example of a successful federal grant application that was approved by NSF. Links to additional grant writing resources are also provided.

Developing a credible source checklist

As one of the outcomes, our team developed a credible source checklist to help students assess the quality of academic and trade publications (See Appendix 3). Since first being introduced in the summer 2017 semester, it has been implemented in all sections of ENC 3246. The checklist is divided into two categories that address academic journal articles and trade magazines respectively, and it requires students to evaluate markers of distinction in the documents they locate through research. These markers include the presence of high-quality references, author credentials, publisher's reputation and affiliations, and evidence of peer review.

The checklist has also been integrated into the document design analysis assignment (a preparatory assignment in the Failure Analysis Project). For this assignment, the students examine the interface and page design of online journals and trade magazines and use the checklist to assess the credibility of the online materials they find. An in-class demonstration led by the instructor, using journal and trade magazine articles sourced through the library's online databases, allows students to see the criteria applied to real documents as they begin their own research. These demonstrations not only introduce students to the markers of scholarly and trade literature but also model the research process for students unfamiliar with navigating the library databases.

Finally, the development and use of the credible source checklist is part of a larger effort between MSL and the UWP to encourage writing instructors to integrate topics on library research into their lesson plans and assignments, which will complement and reinforce information sessions led by library faculty. By discussing and modeling effective library research on a regular basis in the classroom, we hope to emphasize the importance of information literacy in engineering practice and encourage students to embrace effective research skills as an integral component of their future careers. In addition, we hope that these resources will provide less

experienced UWP instructors with the necessary tools and support to ensure instructional coherence across all sections of ENC 3246.

Developing material for the Failure Analysis Project

The Failure Analysis Project was introduced in summer 2017 in order to add a broadly applicable writing task that would feature research as an ethical practice, thereby better supporting current ABET criteria. Several of the new research tools discussed in this paper, including the credibility checklist and updated course guides, also reflect ABET accreditation criteria, specifically General Criterion 3 [1, pg. 3] (Student Outcomes) and General Criterion 5 (Curriculum) [1, pg. 5].

This assignment was further developed in response to a recent initiative from the UF College of Engineering to provide students with a comprehensive education on engineering standards and their applications. The Failure Analysis Project therefore allows students to work through a practical application of standards in their field, while also serving as a point of discussion on the importance of credibility assessment and information literacy in engineering. To complete the assignment, students either research an existing engineering failure in their field, or they conduct an original failure analysis on a product or process of their choice using an established method of analysis. Both options for this assignment challenge students to analyze the causes of failure and base their conclusions on relevant engineering standards. As a result, students discover the role that standards play in mediating hazards and ensuring quality and safety in professional practice.

Because the Failure Analysis Project introduces students to the real consequences of relying on incomplete or inaccurate sources, it underscores the importance of establishing good research practices early in their undergraduate education. One of the primary goals of the partnership between MSL and the UWP is to help students develop these skills through the use of new resources and the expansion of library instruction sessions, exemplified by the flipped-classroom approach discussed in more detail below. It is our hope that these changes will not only serve to ground the learning objectives of the course in concrete, relatable examples, but will also equip students with the tools and awareness needed to respond effectively to similar circumstances in their future work environment.

Piloting a Flipped Classroom Approach

By the beginning of fall 2018, the focus of the team shifted to how library instruction was provided for the course. Traditionally, the library instruction for ENC 3246 was deployed via one-shot sessions with the research guide to act as reference for the rest of the semester. In an ideal situation, librarians would have more time and multiple sessions to create conceptual understandings of information literacy, as opposed to a one-shot instruction session focusing on a practical orientation to the libraries. However, librarians teaching in person instruction sessions to 25 sections multiple times during the semester was unrealistic. The team began to discuss creating a flipped classroom approach using videos with formative assessments uploaded into the course's learning management system (LMS) page and in-class active-learning curriculum.

The team decided to pilot a flipped classroom approach in two sections with instructional material based on the Association of College and Research Libraries (ACRL) Framework for Information Literacy in Higher Education (Framework) [11]. Bishop and Verleger [12] “define the flipped classroom as an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom.” For this audience in particular, we connected the select frames from the

Framework to discipline-specific assignments as a means of illustrating the application of the frames.

As mentioned above, the pilot was implemented for two of the 25 sections in the course. Prior to each 25-minute in-class session, 18 students in each of the two sections would complete a module in the LMS that would include watching a video on information literacy, answering a short quiz based on the video, and reading the instructions for the active learning session to occur in class. When in class, librarians would lead students in a 25-minute active learning session (half of the normal 50-minute class), developed using Backward Design [13]. Active learning emphasizes "instructional activities involving students in doing things and thinking about what they are doing" [14]. These sessions were designed to link the information literacy videos and the Framework to the course's curriculum (see Table 1).

Week	Course Assignment	Video	ACRL Frame
5	Annotated Bibliography	Books	Searching as Strategic Exploration
7	Document Design Analysis	Scholarly and Trade Literature	Authority is Constructed and Contextual
9	Failure Analysis Project	Standards	Information Creation as Process
11	Formal Research or Lab Report	Patents	Information has Value
13	Proposal or Grant Application	Databases	Research as Inquiry

Table 1: Assignment-Video-Frame Guide

For example, the first video advocates for the usefulness of books in engineering research. This video is introduced in conjunction with the annotated bibliography assignment; the in-class activity asks students to find three reference books individually. Then, students create groups of four to discuss how they located their reference books, why they decided to choose those books, and how they might be useful for their failure analysis. This flipped classroom session is designed to teach students the knowledge practices associated with the ACRL frame, Searching as Strategic Exploration (see Appendix 4). Specifically, students learn to "match information needs and search strategies to appropriate search tools, design and refine needs and search strategies as necessary, based on search results, understand how information systems are organized in order to access relevant information, and use different types of searching language appropriately"[11].

Creating a series of information literacy videos

Beginning in 2014, librarians at MSL made a series of 15 videos to aid engineering students in ENC 3246. The videos covered a variety of areas including: using the library website, catalog, course research guide, and Compendex; searching for patents, codes, standards, and e-books; and managing references, specifically with RefWorks. This series of videos presented information via Powerpoint slides with voice over from an engineering librarian and averaged about 3 minutes. The videos were hosted on YouTube and then embedded on various web platforms.

The team determined the videos needed to be updated after major changes had been made to the MSL website as well as the research guide, as described in the "Redesigning the Research Guide" section. As the team embarked on updating our video series, the new videos would take a different approach that emphasized the utility of information resources for engineers, analyzing their uses and benefits in different areas. We began with five videos: books and ebooks, patents, standards and codes, databases, and scholarly and trade literature.

We held a short discussion about the relevance of videos in library instruction and the format the videos should take. As librarians who are often not embedded in courses, we determined videos were a viable choice because of their efficacy in relaying information [15]–[18] as well as allowing for instructors to use our content on demand. Also, we chose videos because they can be easily uploaded into the university's LMS. The videos could then be mapped to the curriculum to maximize impact; for example, the technical standards video was determined to be most beneficial for students during their Failure Analysis Project.

To create the videos, we first defined the aesthetics. We determined the videos should all use the same "splash page" at the beginning, one which introduces MSL and UWP as the creators of the video. The videos would then switch to the presenter on screen with text overlay; the presenter role would either be filled by a librarian or UWP instructor. The presence of the instructor in the video can improve information recall, reduce perceived mental effort, and increase perceived learning and satisfaction [19]. The videos would then be filled with a combination of presenter with text overlay, screen capture video, animations, and images, with the content determined by the need of each video's subject. We assigned the task of creating scripts and storyboards to individual team members; videos were then reviewed by two other team members upon creation.

The team approached the Center for Online Innovation and Production (COIP) to handle video production for the videos. COIP's video production services would allow the team to create videos with all of our predetermined components. However, the team decided to create the beta videos using screen capture of PowerPoint slides with voiceover for the spring 2018 pilot. These videos are mp4 files hosted on the university's LMS. The team solicited feedback from the students during the spring 2018 pilot about these draft videos.

Developing an assessment instrument

In order to assess the impact of the sessions, students in the two pilot sections will complete an identical diagnostic and summative assessment, at the beginning and end of the semester. The assessment instrument asks students to rate specific resources and resource types on their credibility and explain their decision (See Appendix 5). The instrument was created using Qualtrics (approved by UFIRB (IRB201703316)) and utilized drag-and-drop ranking and conditional logic. At the beginning of the assessment, students were given ten resources and asked to rank them green, red, or yellow. The resources are represented by citations. Green represented a credible resource that can always be cited. Yellow represented a resource that can be credible but needs to be assessed on a case-by-case basis. Lastly, red represented a resource that is not credible and should not be cited under any circumstances. Upon ranking all ten resources, students are asked to explain why they chose green, yellow, or red for each individual resource. Then, students complete a similar assessment activity except they are asked to rank resource types instead of specific resources. Students use the same green, yellow, and red ranking activity to assess resource types such as standards, technical reports, trade publications,

and patents. Once the summative assessment is completed by students at the end of the semester, the team will review the results and conclude the pilot.

Conclusion and Next Steps

The research guide, credibility checklist, and Failure Analysis Project have been fully implemented into all sections of the course as of spring 2018. Review of these components will be ongoing, although no formal assessment and review has been established. The future of the rest of the collaboration will be based on the assessment of the flipped classroom pilot that the team set in place for the spring 2018 semester. Upon the completion of the spring 2018 semester, the team will analyze the data from the assessment instrument as well as the student feedback on the videos and convene with stakeholders from MSL and UWP. If the assessment results are positive, the team will move forward with deploying the flipped approach to more sections. As for the videos, the revamping process will begin with the solicited feedback from the students in the spring 2018 pilot sections of the course. The team will use this feedback to make changes to the videos for the fall 2018 semester. MSL and UWP will work with COIP to create the final videos. COIP specializes in creating video content for online courses at UF; our goal is to create the most impactful videos, utilizing COIP's expertise in regard to video creation.

In fall 2018, we are also looking forward to potentially applying the flipped approach to the online sections of the course. This process may seem difficult considering the nature of online courses. However, asynchronous online courses will allow for instructors to create homework activities in tandem with the videos. Students would be introduced to assignments with a preparatory assignment and a library component, which sets up the major assignments.

References

[1] Engineering Accreditation Commission, "Criteria for Accrediting Engineering Programs, 2016 – 2017," 20-Oct-2015. [Online]. Available: http://www.abet.org/wp-content/uploads/2015/10/E001-16-17-EAC-Criteria-10-20-15.pdf [Accessed: 14-Mar-2018].

[2] American Library Association, "Information Literacy Standards for Science and Engineering/Technology," *Association of College & Research Libraries (ACRL) Science and Technology Section (STS)*, 24-July-2006. [Online]. Available: http://www.ala.org/acrl/standards/infolitscitech [Accessed 23-April-2018].

[3] L.R. Hanlan, R.A. Ziino, and A.H. Hoffman, "Assessing student information literacy skills and the effectiveness of an evolving faculty-librarian collaboration in a first year design course." In *Frontiers in Education Conference, 2013 IEEE*, pp. 1444-1446. IEEE, 2013.

[4] S. Palmer and B. Tucker, "Planning, delivery and evaluation of information literacy training for engineering and technology students." *Australian Academic & Research Libraries,* vol. 35, no. 1, pp. 16-34, Mar. 2004.

[5] J.C. Roberts and J. Bhatt, "Innovative approaches to information literacy instruction for engineering undergraduates at Drexel University." *European Journal of Engineering Education,* vol. 32, no. 3, pp. 243-251. Jun. 2007.

[6] E. Barsky, K. Read, and A. Greewood, "Teaching Matters: Increasing Library Visibility through Integrated Classroom Instruction." *Partnership: the Canadian Journal of Library and Information Practice and Research*, vol. 6, no. 1 pp. 1-5. 2011.

[7] T. Maddison, D. Beneteau, and B. Sokoloski, "Breaking ground: Improving undergraduate engineering projects through flipped teaching of literature search techniques." *Issues in Science and Technology Librarianship,* Fall 2014. doi: 10.5062/F4QR4V3D.

[8] B. Kerr, "The flipped classroom in engineering education: A survey of the research." In *Interactive Collaborative Learning (ICL), 2015 International Conference on*, pp. 815-818. IEEE, 2015.

[9] T. Maddison, "A Matter of Size: Flipping Library Instruction in Various Engineering Classrooms." *Issues in Science & Technology Librarianship*. Fall 2015. doi: 10.5062/F4QV3JJ5

[10] "Evaluating Internet Research Sources." [Online]. Available: https://www.virtualsalt.com/evalu8it.htm. [Accessed: 05-Feb-2018].

[11] American Library Association, "Framework for Information Literacy for Higher Education," *Association of College & Research Libraries (ACRL)*, 09-Feb-2015. [Online]. Available: http://www.ala.org/acrl/standards/ilframework. [Accessed: 17-Jan-2018].

[12] J. Bishop and M. Verleger, "The Flipped Classroom: A Survey of the Research," in *2013 ASEE Annual Conference & Exposition*, 2013, pp. 23.1200.1–23.1200.18.

[13] G. P. Wiggins and J. McTighe, *Understanding by Design*, Expanded 2nd ed. Alexandria, VA: Assoc. for Supervision and Curriculum Development, 2005.

[14] C.C. Bonwell and J.A. Eison. "Active Learning: Creating Excitement in the Classroom," in *1991 ASHE-ERIC Higher Education Reports*, 1991.

[15] B. J. McNeil and K. R. Nelson, "Meta-analysis of interactive video instruction: A 10 year review of achievement effects," *Journal of Computer-Based Instruction*, 1991.

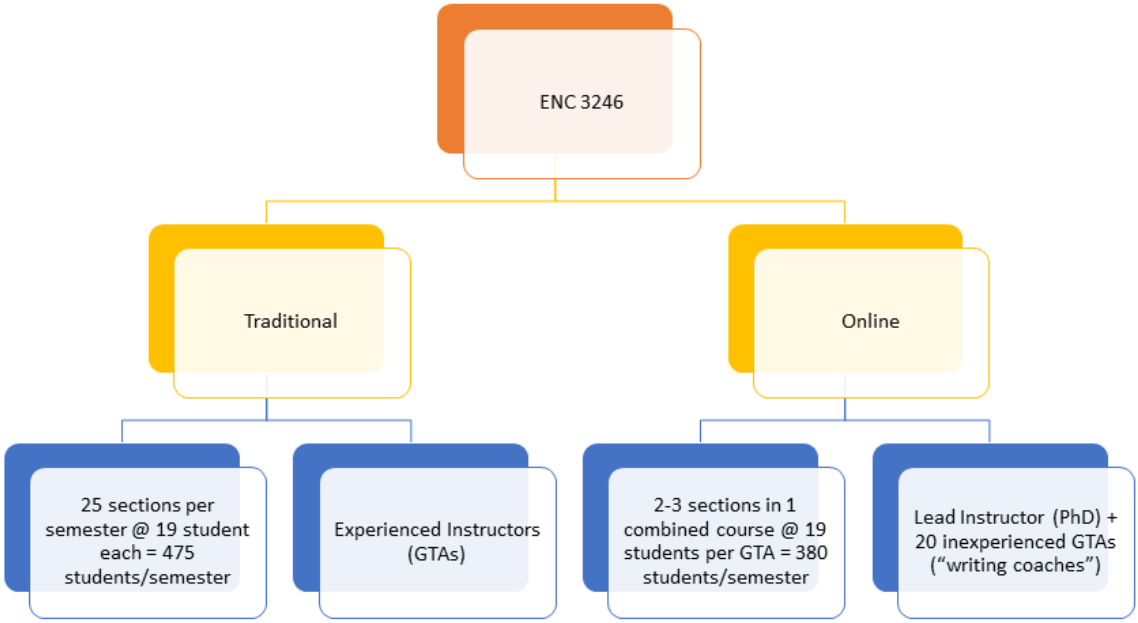
[16] D. Zhang, L. Zhou, R. O. Briggs, and J. F. Nunamaker, "Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness," *Information & Management*, vol. 43, no. 1, pp. 15–27, Jan. 2006.

[17] N. A. Martin and R. Martin, "Would You Watch It? Creating Effective and Engaging Video Tutorials," *J. Libr. Inf. Serv. Dist. Learn.*, vol. 9, no. 1–2, pp. 40–56, Jan. 2015.

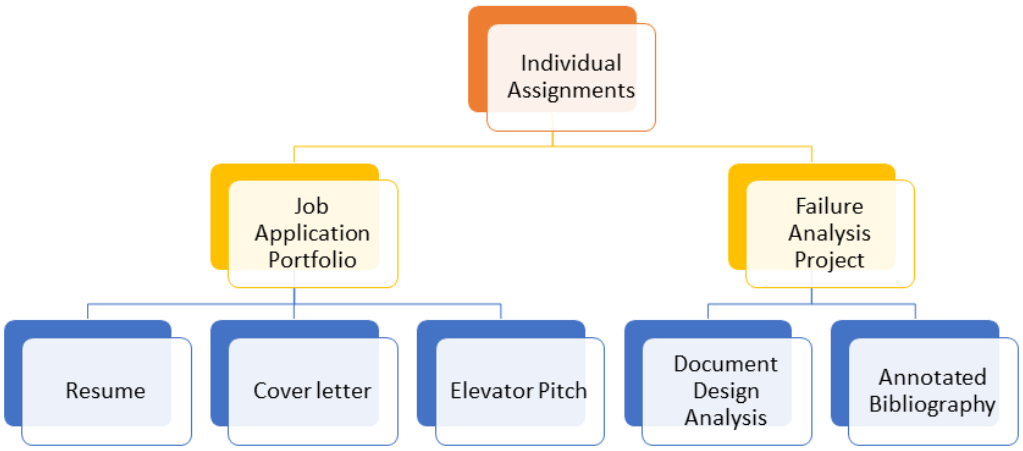
[18] I.-C. Hung, Kinshuk, and N.-S. Chen, "Embodied interactive video lectures for improving learning comprehension and retention," *Comput. Educ.*, vol. 117, pp. 116–131, Feb. 2018.

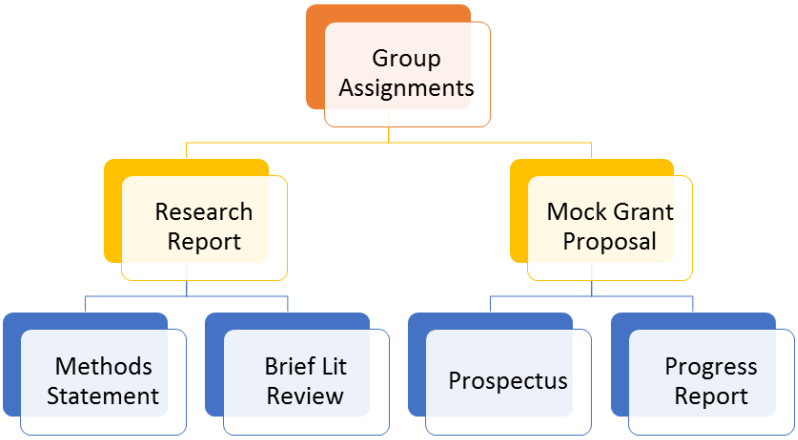
[19] J. Wang and P. D. Antonenko, "Instructor presence in instructional video: Effects on visual attention, recall, and perceived learning," *Comput. Human Behav.*, vol. 71, pp. 79–89, Jun. 2017.

Appendix 1: ENC 3246 Section Breakdown



Appendix 2: ENC 3246 Individual and Group Assignment Breakdown





Appendix 3: Credible Source Checklist on Course's LMS Page

Credible Source Checklist

Journal Articles

- ❑ Targets scholars, researchers, students
- ❑ Written by scholars and researchers in the field
- ❑ Authors' credentials provided or easily found
- ❑ Provides evidence of peer review (2 or 3 dates: original submission, revision, & publication)
- ❑ Reports results of original research or analysis
- ❑ Uses jargon/field-specific language. May require prior knowledge
- ❑ References or Bibliography is provided, contains credible sources
- ❑ Sources are cited, footnoted
- ❑ May contain complex charts or graphs
- ❑ Plain, dense, text-based pages
- ❑ Contains few if any advertisements

Examples

Journal of Materials Science, Journal of Biotechnology, Journal of Industrial Engineering & Management, Medical & Biological Engineering & Computing, Journal of Chemical Engineering & Data, IEEE Access, Journal of Environmental Engineering, Progress in Aerospace Sciences

Trade Publications

- ❑ Targets other professionals in the discipline
- ❑ Written by working professionals in the field
- ❑ Identifies the subject or industry clearly in the title of the magazine
- ❑ Features full-color pictures and glossy pages; is visually attractive

- ❑ Provides practical, concise technical content (*i.e.* basic understanding of the industry is assumed
- ❑ Offers discipline-specific information about technical operations, recent innovations, products, and/or industry news
- ❑ Includes jargon common to the profession and/or trade (*i.e.* articles read like "insider" conversations)
- ❑ Published by a professional organization within the industry
- ❑ Only contains limited, professionally-targeted advertisements
- ❑ Can be found through the library databases or a professional organization or a professional organization

Examples

AI Magazine, Electronic Design, Electronics World, IEEE Circuits & Devices, IEEE Spectrum, Mechanical Engineering, Machine Design, Civil Engineering, Plant Engineering, New Electronics, Flight International

Appendix 4: Sample ENC 3246 Session Backwards Design Lesson Plan

#1 Books and Ebooks

Stage 1 - Desired Results

Established Goals:

- Searching as strategic exploration
  - match information needs and search strategies to appropriate search tools
  - design and refine needs and search strategies as necessary, based on search results
  - understand how information systems (i.e., collections of recorded information) are organized in order to access relevant information
  - use different types of searching language (e.g., controlled vocabulary, keywords, natural language) appropriately

Understandings: *Students will understand that…* • Books are useful resources • Books are broken into several genres depending on their intent and scope • Searching the library catalog and databases is different than searching Google.	**Essential Questions:** • What use do books have in the age of Google?
Students will know… • The different resources to search for books • The types of books and the distinctions between them	*Students will be able to…* • Use the library catalog and Knovel to search for books • Find books that fit their information needs

Stage 2 - Assessment Evidence

Performance Tasks: • Create a list of useful reference sources (handbooks, encyclopedias, dictionaries, etc.) for use in the course	**Other Evidence:** • Written and oral feedback to instructor • Quality of resources on list

Stage 3 - Learning Plan

Learning Activities:

- Video on Books
- Ungraded quiz on video
- Active Learning Exercise on finding reference sources. The students spend 10 minutes individually finding 3 reference materials related to their engineering disciplines. Students then spend another 10 minutes pairing with students in the same disciplines, discussing their search strategies, and sharing the resources they discovered.
- In-class demonstration of the catalog and Knovel

Appendix 5: ENC 3246 Assessment Instrument