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Assessing a Customized, Interactive Online Information Tutorial: The Getting Started with Research Module
Évaluation d'un tutoriel en ligne interactif et personnalisé sur la maîtrise de l'information : le module « Getting Started With Research »

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See table of contents

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Article abstract

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Assessing a Customized, Interactive Online Information Tutorial: The *Getting Started With Research* Module

Évaluation d'un tutoriel en ligne interactif et personnalisé sur la maîtrise de l'information : le module « Getting Started With Research »

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Abstract / Résumé

After creating an online information literacy tutorial in response to the shift to online learning due to the COVID-19 pandemic, a team of six library employees developed a multi-pronged approach to assessing the module to determine how well it met the stated learning objectives. This article describes the assessment of the *Getting Started With Research* information literacy module, a learning experience developed using Articulate Rise 360 software and accompanied by a Google Forms research log for students to complete. The authors present results from both a rubric-driven and textual analysis study undertaken to assess student responses to the research logs, and they discuss how the study's findings will inform future practice.

Après avoir créé un tutoriel en ligne sur la maîtrise de l'information en réponse au passage à l'apprentissage en ligne dû à la pandémie de la COVID-19, une équipe de six employés de la bibliothèque ont développé une approche multidimensionnelle pour

évaluer le module afin de déterminer dans quelle mesure il répondait aux objectifs d'apprentissage énoncés. Cet article décrit l'évaluation du module de la maîtrise de l'information « Getting Started With Research », une expérience d'apprentissage conçue en utilisant le logiciel Articulate Rise 360 et accompagnée d'un carnet de recherche Google Forms à remplir par les étudiants. Les autrices présentent les résultats d'une étude axée sur une rubrique et une analyse textuelle entreprise pour évaluer les réponses des étudiants aux carnets de recherche et ils discutent de la manière dont les résultats de l'étude éclaireront les pratiques futures.

Keywords / Mots-clés

Online tutorial, rubric analysis, asynchronous instruction, active learning, textual analysis; Tutoriel en ligne, analyse par rubrique, formation asynchrone, apprentissage actif, analyse textuelle

Introduction

Active learning and the engaged classroom are concepts that have driven the development of foundational information literacy instruction at Penn State University, a large, public, multi-campus university with over 90,000 FTE including students in the online learning program. At the University Park campus, about 75% of the more than 100 sections of first-year composition receive library instruction. The COVID-19 pandemic, however, necessitated a quick departure from face-to-face instruction. Seeing this as an opportunity to build library integration into the first-year composition program from scratch, a team of information literacy librarians and an instructional designer collaborated to build an online, accessible, foundational research skills module that met identified learning objectives and incorporated active learning.

This article describes the assessment of the *Getting Started With Research* information literacy module, an online learning experience accompanied by a Google Forms research log for students to complete. The authors describe both a rubric-driven and textual analysis study undertaken to assess student responses to the research logs, and they discuss how the findings of the study will inform future practice. This approach to assessment is innovative in that computer-driven content analysis is a unique approach to assessing the effectiveness of online learning objects in the library field. Employing a rubric-driven analysis alongside textual analysis provides a fuller picture of a learning object's effectiveness. This approach also provides insights into student learning because the librarians analyze the students' own words from their research log entries, rather than simply tabulating their responses to a survey.

Literature Review

The library and information studies (LIS) literature includes numerous articles outlining the development and assessment of online information literacy tutorials that supplement or even replace traditional one-shot instruction. A sampling of a few recent studies is included here. Harding and Shepard (2020) described an extensive redesign of a core information literacy tutorial, including needs assessment, design platform, and

accessibility. Lierman and Santiago (2019) detailed the development of multiple online lessons based on best practices gleaned from a review of the literature. Focusing on the role of learning outcomes in building an information literacy tutorial, Paulson and Laverty (2018) described the development and design of learning outcomes using the backward design process.

Various methods for assessing online information literacy tutorials are described in the literature. Authors have discussed the use of pre- and post-tests (Schilperoort, 2020; Stiwinter, 2013; Tronstad et al., 2009) as well as student responses to surveys (Thompson & Carrier, 2016) to evaluate the success of a tutorial. Matlin and Lantzy (2017) went a step further in their research to assess student achievement of information literacy learning outcomes from an online tutorial compared with in-person classroom instruction. Matlin and Lantzy evaluated identical library assignments from both groups as well as student survey responses and found that online and in-person instruction achieved comparable results.

The use of rubrics as an assessment method is also described in the LIS literature in relation to both in-person instruction (Badia, 2019; Markowski et al., 2018) and online tutorials. Schweikhard et al. (2018) applied a rubric to final papers in a graduate-level occupational and physical therapy course to assess the impact of online library tutorials on information literacy skills, and they found a significant increase in students' searching abilities. Goodsett (2020) used best practices for teaching critical thinking gleaned from a literature review to inform a rubric that can be applied to online information literacy learning objects.

Content analysis (also referred to as narrative or textual analysis) of the type used in the current study, defined by Stemler (2001) as "a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding," (p.1) appears to be a less common method of assessment in the LIS field and typically has not been used in the evaluation of online information literacy tutorials. Insua et al. (2018) applied qualitative textual analysis to student reflections on the research process in journal entries and identified potential instructional strategies based on students' self-identified challenges with their own research. Other LIS researchers have used text analysis to code student responses in focus groups to identify common themes related to the students' research practices and opinions about the library (Gibbs et al., 2012). Koelling and Russo (2021) took a unique approach by using text analysis to determine how information literacy elements were presented in first-year composition assignments developed by teaching assistants.

Module Development

The impetus for creating the *Getting Started With Research* module was the need to provide asynchronous library instruction to first-year composition courses during the beginning of the COVID-19 pandemic. Module content was drawn from lesson plans used in face-to-face instruction and adapted for the online environment to include interactive activities that engage students and allow them to test their knowledge as they work through the information provided.

The module was developed using Articulate Rise 360 software, an online course authoring tool. The module includes 15 mini lessons that guide students through the research process, with an emphasis on identifying keywords and refining search results. The components of the module are intended to address two primary learning outcomes, which are stated at the outset:

- Identify keywords in order to chart a research path that will lead to a deeper understanding of a topic.

- Refine search results using built-in database features and/or search term refinement in order to locate resources that meet your specific information needs.

The beginning of the module introduces students to the research process as a multi-step, iterative process. The module then guides them through choosing a topic, identifying keywords, conducting preliminary research, and selecting sources. The librarians intended that the module be integrated into a course at the time when students are required to do research and thus can use their own topics to complete the tasks in the module. The module includes multimedia objects and learning activities, such as an interactive tutorial on keywords, a sorting activity on topic selection, and videos on using databases and the library's discovery tool.

A unique component of the module is an online research log (see Appendix), completed using a Google form, that enables students to record their own topics, keywords, and search results, thus facilitating a customized experience for each student. Fluk (2015) detailed the value of research logs as a pedagogical tool. The log that accompanies the module was based on a paper version that instruction librarians had developed for use during face-to-face instruction to guide students through the research process using their own topics. The log prompts students to reflect on their own research process before they even begin the module. Step one of the log instructs students to "reflect on your own research process. How do you begin? What online resources do you use? How are you going to approach your research process for your assignment?" This reflection is an important piece of the learning process because it activates students' prior knowledge and experience as a foundation for what they will learn as they complete the module and the rest of the research log.

As the students proceed through *Getting Started With Research*, steps two through five of the research log prompt them to enter their topics, identify keywords related to their topics, develop and document narrowed topics, and record additional keywords they identify as they perform their searches.

Reflection as a pedagogical tool surfaces again in step six of the research log, after the students have chosen keywords, narrowed their topics based on findings, and refined their search terms. They are asked to reflect on their process and what techniques worked best to attain the needed information sources. Finally, not only are students prompted to select a related source; they are also asked to discuss why they chose that source and write a final reflection on how their research process has changed and what they learned from the module.

Assessing Student Learning

Structuring *Getting Started With Research* to meet specific, measurable learning objectives enabled the team to assess whether students had indeed grown in the articulated skills addressed by the module. During the summer 2020 session, 875 students completed the module and submitted research logs. Researchers reviewed a random sample of 324 logs (see the Methodology section) for evidence that the students had been able to 1) generate and refine keywords and 2) locate specific appropriate sources in support of their research topics. This assessment was accomplished through a combination of two methods: rubric-driven analysis of students' articulated keywords and search process, and software-driven thematic analysis of textual responses to the final reflection question in the research log.[1]

Methodology

Rubric-driven Analysis

In order to determine how well the *Getting Started With Research* module met the stated learning objectives, the research team developed a rubric (see Table 1) that could be applied to students' inputs to the research log. The *Cult of Pedagogy's* single-point rubric (Gonzales, 2014) served as a guide for this process, because it was important for the team to assess students' proficiency in relation to the learning objectives. This model of rubric does not examine what students *did not* accomplish and does not list all possible ways a student could fail to meet an expectation, but rather emphasizes the levels of proficiency students demonstrated. The single-point rubric model the team selected employs a four-point rating scale to indicate to what level an outcome was met (from "standard not met" to "exceeds expectations"; Gonzales, 2015).

To assess how well students understood the concept of developing effective keywords, the team looked at research log prompts 2, 3, 4, and 5 (see the Appendix), which direct students through the process of identifying keywords, narrowing them, and identifying additional possible search terms. To assess these responses, the team adapted one of the *Cult of Pedagogy* rubrics indicating levels of mastery, using a scale of 1 through 4, with 1 signifying a "beginning" level of understanding and 4 indicating an "exemplary" grasp of the concept (Gonzales, 2014). The same scale was applied to the skill of "source selection," which students are prompted to do in steps 7 and 8 of the research log. Developing the rubric included writing descriptions of each level of mastery to use as guidelines when assigning a particular rating to a research log response. Once the rubric was established, the team held a norming session to ensure that everyone held a common understanding of the ranking system. Prior to the session, each team member independently applied the rubric to a common set of research log responses. During the

[1] The authors submitted their study to the Institutional Review Board (IRB) at their affiliated institution and received notification that the study does not meet the definition of human subject research, so IRB review and approval are not required.

norming session, the team then compared their scoring, discussed reasons for any discrepancies, and adjusted rubric language as necessary.

Table 1

Successful Research Strategies

Strategies	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Effective Keywords (Steps 2, 3, 4, 5)	Phrase or question instead of keywords; Minimal keyword selection (1-2 terms); Vague or general terms; No keyword development	Some development in keywords; Mix of general and specific terms; presence of terms that are either too broad or too narrow in scope	Keywords have developed during research process; most are appropriately scoped	Properly scoped keywords, adjusted during research process	
Source Selection (steps 7, 8)	No evidence of refinement of results; No/minimal articulation of appropriateness, currency, usefulness to researching the topic; Source may not relate well to the research topic	Some refinement of results; Articulates 1-2 criteria that support source selection; Source may not relate well to the research topic	Articulates 2-3 criteria that support source selection; Demonstrated refinement of results; Source supports research topic	Articulates that source is relevant to topic, appropriate for audience, appropriately current, useful to the research; Demonstrated refinement of results; Source supports research topic	

Note: Rubric adapted from Cult of Pedagogy (2014). Template #2 for Single-Point Rubric. https://www.cultofpedagogy.com/holistic-analytic-single-point-rubrics/

Once the team had sufficiently tested the rubric, they selected a random sample of research logs to assess. A random sample is a proportion of the population who were potential participants in the learning experience (Qualtrics, 2023). Although the total number of research logs completed during the summer 2020 semester was 874, the entire population of potential participants was 2,096, representing all students enrolled in the first-year composition course into which the module was embedded, who therefore had the *potential* to complete it. The team used the sample size calculator (Qualtrics, 2023), set to the default confidence level of 95% and margin of error of 5%, to obtain a sample size of 325. Next, they used a random number generator (Furey, 2023) to select 325 research log records, separated into 6 groups (one for each evaluator), from a master spreadsheet of submissions. Finally, each evaluator used a spreadsheet to track their assessment of each research log.

Because one of the randomly selected records was an invalid submission, the sample size was 324.

Software-driven Textual Analysis

In addition to the rubric assessment, three of the researchers from the team conducted a textual analysis of student responses using the qualitive data analysis software NVivo. NVivo allows researchers to create and assign codes to sections of text in order to identify common themes within a body of work and to quantify the use of key words and phrases. The researchers chose NVivo as an assessment tool in order to analyze students' own responses to the log questions. In both in-person and online methods of teaching, librarians often do not have direct access to student-produced work; the use of NVivo provided a unique opportunity to analyze students' thinking about the research process. The research team used NVivo software to code and analyze 324 students' responses to the last prompt in the research log (Step 9): "Refer back to your initial answer on your research process. How has this module changed how you look at your initial process? What will you do differently in the future as you research topics? What is one thing you learned from the module?"

The 324 responses had been divided into six data sets of 54 or 55 responses each, and each of the three researchers analyzed two data sets. After an initial pass through the data, the researchers met to discuss their progress and adjust the codes they were using for consistency and inter-rater reliability across the data sets. During the discussion, the researchers decided on standardized language for the codes and eliminated or combined some codes that were only used a few times. The following codes and sub-codes were used in the analysis:

- Research
    - Keywords
    - Evaluating sources
    - Narrow terms
- Library resources
    - Opposing Viewpoints database
    - Library discovery tool
    - Databases
- Change in search process

Results

Rubric Analysis Results

Based on the rubric evaluations, students scored an average of 3.12 out of 4 on their understanding of how to effectively develop keywords for research. Understanding of the source selection process was not as strong, with an average score of 2.32 out of 4. In addition to calculating scores for students' understanding of keyword development (3.12 out of 4) and the source selection process (2.32 out of 4), the research team

pulled key themes and highlights from student reflections. Many students were not shy about sharing their previous (less effective) approaches to research. For example, one student shared, “I usually would just use google to search for some source. I learned a more reliable way to research. I also learned how to use keywords to choose a [*sic*] appropriate specified topic.” From time to time, they did note the connection between what they had experienced via the module and the understanding that the process of keyword and search refinement leads to better source selection. One comment that supported this theme was, “[The module] helped me find much more credible sources than just choosing the first website off of Google.” Similarly, another student stated, “It made me focus more on keywords whereas before I would just be searching for a long time with a very broad search engine use.” Student responses also often supported the notion that the library itself plays an important role in academic research. Sample responses that affirm this include, “One thing I learned from the module was how to use Penn State’s resources for researching things,” and, “This has changed my process because I didn’t know about LionSearch [the Libraries’ discovery system] previously.”

A non-rigorous assessment of the responses revealed that students most often reflected on their newly gained understanding of the keyword selection and modification process via responses such as, “This has changed how I type in keywords. ... I will use more narrow terms to eliminate useless articles,” and, “This module has taught me how to use keywords and how to approach my research differently and more effectively.” Some students gave an even greater explanation of how or why keyword use might serve them well in the future. “I'll put more effort into narrowing things down for my research in order to be more efficient,” said one student. Another shared

This module has helped me to dive into the process more and make my initial steps more detailed. In the future I will narrow down my topic earlier to make the process easier. Something I learned from this module is that I can narrow down my searches to make the results more useful to myself.

While these responses about keywords were incredibly validating and encouraging, the team noted a significant difference between students’ successful articulation of the keyword identification and narrowing process and their reflection–or lack thereof–on the source selection process. While the researchers cannot ask the participants why one lesson “stuck” more significantly than another, they revisited the module content itself, looking at it through the lens of the rubric assessment findings. Upon doing so, the researchers identified a few possible theories for students’ superior performance and reflection about keywords.

The first theory is that audience attention span impacted retention of the presented material. While the module is a brief learning experience, it does require 30 to 45 minutes of student time to complete. Keywords are the first topic covered in the module and thus are likely to receive fuller attention from students. In addition, when examining the module content in detail, we realized we had spent significantly less teaching time on the concept of making an appropriate source selection than we did on choosing search terms. In sum, fatigue, along with less detailed content, may have contributed to lower retention of the concept of making a good information source choice.

NVivo Analysis Results

The NVivo analysis revealed that students did see a change in their search process as a result of completing the module. The researchers coded a total of 150 instances of references to a change in search process. Students talked about changing their research process in the future to use library resources instead of Google to find more credible sources and about using keywords instead of phrases to narrow down their searches. For example, one student commented, “This module has changed how I look at my original process now because I have learned a lot more about research databases that are given to me.” Such responses indicate that the module helped students move beyond a basic Google search to a more in-depth exploration of library databases.

The data analysis indicated that students found the instruction on using keywords to be valuable. The term “keywords” appeared 142 times in the data, and because some students used “key words” or “key terms” as two separate words, the use of the term “key” 69 times is another indication of the importance of the keyword instruction in the module. Researchers coded 155 references to keywords. Students mentioned the value of learning how to break a broad topic into keywords to help narrow their search. One student stated, “I found it really helpful to pick out keywords and look for keywords in sentences to help find good material. In the future I will look for keywords and refine options for less material to look at.”

Some students talked about using synonyms and variants of search terms to identify relevant sources, and some commented on the usefulness of skimming article abstracts and introductions to look for additional keywords. These responses indicate that the module was successful in meeting its first learning outcome: “Students will be able to identify keywords in order to chart a research path that will lead to a deeper understanding of a topic.”

In addition to the use of keywords, students also described the importance of learning to narrow their search from very broad to more specific. Researchers coded 77 references to “narrow terms.” Students described using the tools and techniques presented in the module to refine their searches and retrieve more relevant results, making comments such as, “Something I learned from this module is that I can narrow down my searches to make the results more useful to myself.” These results suggest that the module met the second learning outcome: “Students will be able to refine search results using built-in database features and/or search term refinement in order to locate resources that meet your specific information needs.”

Students did discuss evaluating and selecting sources in their responses, but to a lesser extent than using keywords and narrowing searches. Researchers coded 59 references to evaluation of sources. Although students did not use the term “evaluate,” they did use words such as “credible” and “reliable” when describing their sources; for example, one student wrote, “This module just changed my look at how I go about finding my sources and making sure they are credible.” The module lesson on choosing sources lists criteria to use when selecting a source but does not specifically refer to evaluation, so it

is not surprising that terms such as “evaluating” and “evaluation” did not appear in the data.

A small number of students mentioned the specific criteria for source selection presented in the module (relevancy, appropriateness, currency, bias, usefulness); for example, the data included 14 instances of the term “bias,” and a few students listed the criteria for identifying bias in their responses. One student said, “One thing I learned was using relevance to topic, appropriateness for audience, currency, bias, and usefulness when selecting a source.” The limited discussion of evaluating and selecting sources in the student responses suggests that the module may not present this aspect of the search process in enough depth. These results are similar to findings from the rubric analysis described above.

Students commented on the value of using library databases and search tools, often noting that they had been unaware of these resources and as a result of the module would make use of them in future research. Researchers coded 45 references to databases in general and 72 references to the library’s discovery tool. There were only 8 mentions of the Opposing Viewpoints database, suggesting that students did not find it as useful as the library’s discovery tool.

Many students noted the usefulness of the library’s discovery tool for finding credible sources, compared to Google; for example, a student stated, “I will definitely use the library more often when doing research than google because the sources are much better.” Some students commented on specific search techniques they learned through the module, such as the use of quotation marks for searching a phrase. A few students also mentioned using the citation generator tool in the library’s discovery tool.

Conclusions and Recommendations

The rubric assessment and the NVivo analysis yielded similar results, demonstrating that although the module was effective in teaching students how to use keywords, it was less effective in helping them understand the source selection process. The two analysis methods complemented one another: NVivo facilitated a machine-assisted assessment of concepts that were meaningful to the students and the rubric provided the means for scoring of individual students’ attainment of the stated learning objectives. The tandem approaches enabled the researchers to paint a clearer picture of the data.

Overall, the analysis led the researchers to conclude that the module had a positive impact on student learning. Comments received from instructors using the module in their courses supported this conclusion. One instructor stated, “Many [students] talked about the benefit of using keywords when searching for credible sources, as well as the intention to use LionSearch in their current and future courses.”

The analysis led to several recommendations to consider for the development of future learning objects:

- Use measurable learning outcomes.
    - The learning outcomes guided the development of the module from the beginning and provided a way to measure student success against specific criteria.
- Deliver content in small chunks.
    - As noted in the Results section, students may have been less engaged with the source selection portion of the module. The source selection lesson could be moved to a separate module to be delivered at a different time, or earlier sections could be shortened to allow students more time to engage more with the entire module.
- Partner with course instructor colleagues.
    - Teaching colleagues play a valuable role in the success of learning objects by embedding the experience at the appropriate time in the course and requiring students to complete the work as an assignment.
- Make content relevant to students.
    - Much of the success of *Getting Started With Research* can be attributed to the fact the students are asked to bring their own assignment content to the learning experience. This enhances engagement with the module and gives students a product they can use as they proceed with their assignments.

Use of the module continues to grow: courses beyond the original first year composition program have adopted it, including courses on several additional campuses across the university. During the fall 2021 semester, nearly 1200 students at four campuses completed research logs. Results of this study, combined with positive comments from both instructors and librarians, support the ongoing use of the module to teach the beginning steps of academic research and indicate that the module could effectively be used as an alternative to in-person instruction on these topics.

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Appendix

Research Log

This research log is designed to be used with the *Getting Started With Research* Tutorial. Use the log as you work through the tutorial to help you narrow your topic, identify relevant keywords, and keep track of sources as you find them.

As you complete each step on this log, return to the tutorial and continue working through the module, returning to the log when you are prompted.

Email

For which course are you using this log?

Campus affiliation

Step 1: Reflect on your own research process. How do you begin? What online resources do you use? How are you going to approach your research process for your assignment?

Step 2: Your topic (example: Pollution)

Step 3: Keywords related to your topic, such as specific types, groups affected, locations, etc. (example: plastic waste, marine life)

Step 4: Narrowed topic (example: Effect of plastic drinking straw waste on marine life)

Step 5: Additional keywords you encountered during your searching (example: plastic straws, sea animals, single-use plastics

Step 6: Reflect on your search process. What keywords worked best? Which search refinement techniques did you use? How did that affect your search? How did you recognize when you had found some good resources?

Step 7: Select a good source from your results list in LionSearch and paste the citation below.

Step 8: Describe why you chose this source, using the following criteria: Relevance to topic, Appropriateness for Audience, Currency, Bias, Usefulness.

Step 9: Refer back to your initial answer on your research process. How has this module changed how you look at your initial process? What will you do differently in the future as you research topics? What is one thing you learned from the module? (Remember to click Submit below when you are finished with this step.)