Evidence Based Library and Information Practice

Article

One-shot or Embedded? Assessing Different Delivery Timing for Information Resources Relevant to Assignments

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Abstract

Objective – This study aims to determine if the timing of library in-class presentations makes a difference in the type and quality of resources students use for each of four assignments in an introductory speech class. This comparison of content delivery timing contrasts a single, 50-minute lecture early in the semester with four approximately 12-minute lectures offered just before each assignment.

Methods – First-year engineering students taking Fundamentals of Speech Communication provide the study group. Each speech assignment requires students to turn in an outline and list of references. The list of references for each student was given to the librarians, after the assignments were appropriately anonymized, for analysis of resource type, quality of resource, and completeness of citation. Researchers coded a

random sample of bibliographies from the assignments using a framework to identify resource type (book, periodical, Web, facts & figures, unknown) and quality, based on intended audience and purpose (scholarly, entertainment, persuasion/bias), and compared them to each other to determine if a difference is evident. The authors coordinated what material would be presented to the students to minimize variation between the sections.

Results – The study found a statistically significant difference between groups of students, demonstrating that the frequent, short library instruction sessions produce an increased use of high-quality content. Similarly, the sections with multiple library interactions show more use of periodicals than websites, while completeness of references is not significantly different across teaching methods.

Conclusions – More frequent and timely interaction between students and library instruction increases the quality of sources used and the completeness of the citations written. While researchers found statistically significant differences, the use of a citation coding framework developed for specific engineering research and design tasks means the analysis done in this study is not as accurate as it might be with a framework designed for analyzing the resources required for researching and writing speech assignments.

Introduction

This paper evaluates student references included in assignments when a single presentation ("one-shot") and embedded instruction techniques are used, and contributes to the ongoing conversation among instruction librarians regarding which method is most effective. As awareness of the skills needed by students that are encompassed in information literacy grows, requests for librarians to participate in classes also grows, and finding ways to most effectively teach the content so it does not need to be repeated in later years is critical. Purdue University is working toward a more embedded approach for information literacy whenever possible. Nearly all incoming freshmen at Purdue are required to take the Fundamentals of Speech Communication course. Demonstrating and implementing more effective teaching techniques for this course will impact a large majority of freshmen students across disciplines. Having some empirical evidence to support the benefits of this model facilitates the conversation with faculty, (particularly engineering faculty) who appreciate data-driven decision making.

Literature Review

One-shot library sessions are generally considered to be less impactful than other instruction presentation styles (Badke, 2009; Hollister & Coe, 2003). Orr, Appleton, and Wallin (2001) make a clear argument for moving away from the "one-shot" instruction model:

> It has became [sic] clear that the "one-off," demonstration-style information skills classes delivered out of curriculum context do not necessarily coincide with the students' need for information, are sometimes not valued by the students, and do not necessarily prepare them for the challenges of research, problem solving and continuous learning. Where possible, librarians prefer to use an across-the-curriculum model that incorporates the process of seeking, evaluating, and using information into

> the curriculum and consequently, into all students' experiences. (p. 457)

One-shot instruction sessions have been tested for impact upon student work with varying outcomes (Byerly, Downey, & Ramin, 2006; Fain, 2011; Martin, 2008). Generally, the increased integration of content into the curriculum leads to more positive student outcomes (Jacobs & Jacobs, 2009; Stec, 2006).

The integration of information literacy into the curriculum presents the most opportunity for successful knowledge transfer of information literacy, as well as the highest barrier to entry for librarians (Bean & Thomas, 2010; Brendle-Moczuk, 2006; Hall, 2008; Hollister & Coe, 2003; Jacobs & Jacobs, 2009; Weaver & Pier, 2010). Integration into the curriculum has benefits both for acquired skills for the students as well as for exposure and comfort with the librarian/instructor (Bean & Thomas, 2010; Gandhi, 2005; Weaver & Pier, 2010). Project Information Literacy research has determined that a major need for undergraduate researchers is to have context for the learning objectives. Providing instruction in the context of an assignment fills a crucial need for undergraduates (Head & Eisenberg, 2009a). Communication courses, by virtue of the secondary research required to prepare basic speeches, are particularly good venues for curriculum-embedded information literacy (Hall, 2008; Weaver & Pier, 2010). Creating speeches on a variety of topics should allow students to explore a variety of resources. However, as Head and Eisenberg have found, "Most respondents, whether enrolled in a two- or four-year institution, almost always turned to a small set of information resources, no matter which research context they were trying to satisfy" (2009b, p. 32).

The variety of assignments encourages expanding the freshman students' information toolkit, thereby increasing available tools for future assignments. Freshman engineers generally are unskilled in the practice of information literacy skills, as shown by the predominance of websites in freshman bibliographies (Yu, Sullivan, & Woodall, 2006). Yu et al. (2006) emphasized "finding, interpreting, and citing books, journal articles, and Web sites" (p. 21) as the primary skills that are necessary for freshman engineers. Hsieh & Knight (2008) concluded that the traditional lecture is ineffective for teaching freshman and sophomore engineers. The information literacy skills needed by first-year engineering students are generally part of an introduction to design. Bursic and Atman (1997) investigated the differences in information-gathering skills between seniors working on a design project and those just beginning to learn design. The designs from the first-year students are less complete and lack the contextual awareness and understanding of usefulness and applicability of designs that develop as a result of information gathering.

This study investigates the performance of first-year engineering students during an introduction to a communications course when exposed to two different modes of presentation, a just-in-time model and a one-shot model. The literature indicates that the just-in-time model of instruction is likely to be more effective at building information literacy skills among the students (Hall, 2008; Martin, 2008; Weaver & Pier, 2010). Using a citation analysis model developed specifically to examine bibliographies and outline deliverables of engineering undergraduate students (Wertz, Ross, Fosmire, Cardella, & Purzer, 2011), this article seeks to demonstrate that the mode of instruction results in an increased information literacy of a students in a class and expands on a work-in-progress conference paper (Van Epps & Sapp Nelson, 2012).

Aims

Research Question

Is there a noticeable difference in the quality, type of resource, and completeness of the

references in student assignments when "just-in-time" instruction is used as opposed to a "one-shot" session?

The researchers' hypotheses are that the sections which received the just-in-time instruction will have more references and better citations, in quality, type of resource, and completeness, than the section which received the one-shot session at the start of the semester. All three of the unique questions embedded in the research question as stated will be tested and reported.

Methods

Setting/Courses

Researchers studied a group of first-year engineering students enrolled in three sections of COM 114, Fundamentals of Speech Communication, a course that focuses on oral communication skills for students in all disciplines. Several sections of the class are associated with learning communities (Student Access Transition & Success, 2011a, 2011b), and as a result have only engineering students enrolled. In preparation for assignments in COM 114, two different course instructors contacted engineering librarians to have them present library resources to assist students with the information gathering portion of the four speech assignments to be completed during the semester. Two sections received information in four 12-minute, integrated information literacy instruction sessions (otherwise known as "just-in-time"), prior to the assignment that the instruction was intended to support. One section was given a traditional "one-shot" instruction session of 50 minutes during the second week of the semester, before any of the assignments had been given. All of the students received an equivalent duration of library instruction, just divided differently. Instruction librarians used the same materials and supporting LibGuide for all sessions offered. The LibGuide (http://guides.lib.purdue.edu/com114engr) uses four tabs, one for each assignment. During the one-shot session, all four tabs were addressed during the 50 minutes, while during the mini-lectures, the librarian presented a single tab in each session. The LibGuide and accompanying instruction provides guidance for the students in selecting from a variety of sources appropriate within the context of the assignment. The library instruction focused on the best resources for the types of speeches the students would be giving, in support of the course objective of being able to "use supporting material properly and effectively" when making a presentation (http://www.cla.purdue.edu/communication/documents/COM114_Syllabus2011.pdf). All COM 114 classes are taught in traditional lecture-style classrooms with a computer and projector available in the front of the room. In all cases, librarians used a demonstration/lecture-style of material presentation.

Description of Assignments

Table 1 presents an overview of each of the four assignments, including the focus of the speech, expected deliverables, and an indication of whether the assignment is for individual or group submission.

Table 1
Expected Deliverables for COM 114 Engineering Living Learning Community Students

Assignment 1	Informative Speech – Engineering Innovation	Outline & Bibliography	Individual Submission
Assignment 2	Informative Speech – Process speech	Outline & Bibliography	Individual Submission
Assignment 3	Persuasive Speech – Charitable Donation	Outline & Bibliography	Individual Submission
Assignment 4	Group Presentation – Description of an Engineering Innovation	Outline & Bibliography	Group Submission (3-4 individuals)

See Appendix A for the complete assignment descriptions.

Sample

The population consists of all students enrolled in three engineering learning community sections of COM 114 included in this study (n=75). The data consists of the student deliverables (outlines and bibliographies) for all individual and group assignments in these sections. The full data set for four assignments in the three sections provided a total of 234 outlines and bibliographies. Equal sample sizes were used to represent the just-in-time and one-shot sections. This was done to avoid skewed data which may have resulted from having two sections of the class receiving just-in-time (JIT)/embedded teaching (n=51) and only one receiving one-shot instruction (n=24). The sample analyzed consisted of five papers for each individual assignment per teaching team and three of the group papers from each team. Researchers randomly selected papers from the set of possible papers for each teaching team, and used two methods to randomly select assignments to review, based on how the data was delivered to the librarians. The assignments from the mini-lectures classes were numbered sequentially and a random number generation website was used to identify which assignments would be analyzed. For the one-shot section assignments, copies were printed and researchers randomly selected the correct number of assignments from the pile.

Data Analysis Procedure

After removing any identifying information, instructors sent the student assignments to the librarians. The librarians then coded the references in each bibliography for type of information resource used, quality of the resource based on its scholarly content and lack of bias, and the completeness of the reference included. The coding framework is a modification of that used by Wertz et al. (2011) and can be found in Appendix B. Librarians then compared the quality of resources used, the completeness of citations, and the types of resources used for the particular assignment across the sections for each instructional team. A simple Z-test for comparison of difference between proportions was then used for each rating given to the references.

While it was impossible to control for the instructor/librarian teaching style variations and differences inherent from having different students in each class, librarians coordinated the content presented and used the same LibGuide to ensure all students shared a common resource to return to for guidance as the semester progressed. In this way researchers controlled as many variables as possible to control easily. Though they did not use a set script for delivery of their respective presentations, the two librarians involved have similar teaching styles.

One difference between the sections is due to multiple librarian visits that provide an opportunity for a quick follow-up conducted as a guided conversation of not more than three minutes. This provided the students a chance to reflect upon which tools they used in the previous assignment, how successful they felt they were with the tools, and why those tools were appropriate for the previous assignment. However, this discussion did not impact upon the upcoming assignment, as each assignment required the use of different resources. The discussion did establish that some features of databases (i.e., Boolean logic and operators, limiters, and faceted searching) reappear across tools.

Inter-rater Reliability

Researchers used a simple percent-agreement figure to calculate the consensus estimate of inter-rater reliability (IRR). This calculation involved taking the number of items coded identically by different raters and dividing by the total number of items rated (Stemler, 2004). Both raters analyzed an initial sample of 8 items from the original 234 items, representing one of

each assignment for each instructional method, using the framework developed by Wertz et al. (2011). Each citation is rated for type of material, quality of resource based on both audience and treatment (bias), and completeness of the citation, creating four ratings for each citation. After rating the initial eight items, the two librarians met, checked how their use of the framework aligned, and discussed differences to develop a common understanding of the coding framework. The consensus estimate of inter-rater reliability was calculated as 85.1%; a value above 70% for IRR indicates strong agreement between raters in application of the framework (Stemler, 2004). The largest source of variation between raters came in determining complete, incomplete, and improper citations, which accounts for 44% of the differences in codes applied. These differences were discussed so that raters could reach consensus prior to coding the full data. Finding a sufficiently high agreement rate between raters meant the authors could trust that the individual analysis of the citations would be sufficiently similar and that each could rate half of the references lists to distribute the load. Raters then divided the student outlines based on which presentation method was used, such that each rater had half of the students they taught and half from the other class. More clarity on improper and incomplete reference and what constitutes "easily traceable" could bring the IRR up to 91.6%. Defining a reference as findable meant that basic users could locate the item, rather than requiring the skills of a librarian, who would use the other bits of information present and require more time to track it down.

Coding Framework Modifications

During discussion between the two raters to verify agreement on use of codes, several modifications were proposed to the coding framework. Some required modifications resulted from applying the framework to non-engineering-specific assignments and clarifying the application for the current research. A full description of the modifications made from the original used in Wertz et al. (2011) can be found in the work-in-progress conference paper (Van Epps & Sapp Nelson, 2012).

Results

References Analysis

The sample of 36 bibliographies included 233 references for analysis to determine student use of resources and the ability to document those sources. The bibliographies included an average of 6.5 references per outline (233/36=6.5), which may seem high for first-year students in a speech class. The high average can partially be explained by the team assignment that contained an average of 16.8 references per outline (101/6=16.8) for all teams, thus skewing the average. Without the team assignment, the average number of references per outline is 4.4 (132/30=4.4). While this is still slightly higher than expected, based on an average of 3.57 references in first-year student papers found by Knight-Davis and Sung (2008), it is a reasonable number given the first assignment required two sources and the remaining three assignments all asked for a minimum of three citations.

When analyzing the number of references, the teaching team discovered that the one-shot session students averaged 3.87 (58/15=3.8667) references per individual assignment, and that the mini-lectures session students averaged 4.93 (74/15=4.9333) references per outline.

Resource Quality

Using the quadrants presented by Wertz et al. (2011), as illustrated in Figure 1, the 233 references were rated for quality. Of the full set of 233, 6 were removed from the quality assessment because they were coded as general web (GWEB) resources or unknown (UNKN), and with a broken link it was impossible to determine audience or intent of the resource.

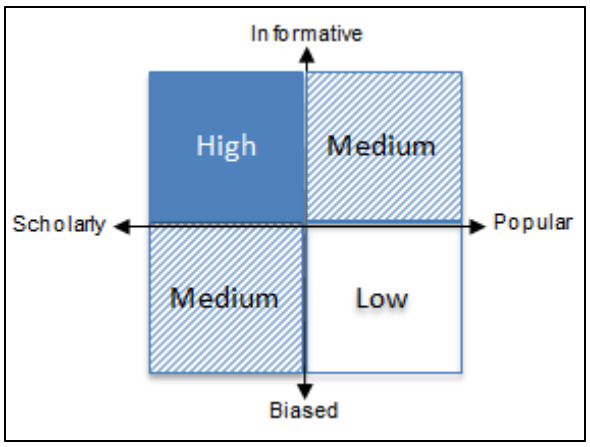

Figure 1
Quality of resources

As shown in Figure 2, the remaining 227 references were analyzed: 34.8% were high quality (scholarly and informative), 59.5% were medium quality (popular and informative, or scholarly and biased), and only 5.7% were low quality (popular and biased or entertainment).

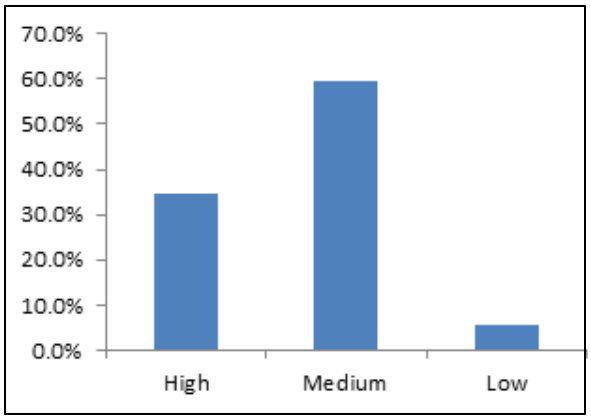

Figure 2
Percent for each quality

Cross-section Analysis

For the cross-section analysis, researchers divided the assignments into two sets by type of library instruction the students received, one-shot or four mini-lectures. The one-shot session included 109 references and the mini-lectures session included 124 references. Both groups had three citations that were removed due to broken links or unknown materials type.

The one-shot section presented the following break-down of references by quality: 2.7% unable to be classified due to broken links, 22.9% high quality, 65.2% medium quality, and 9.2% low quality. The mini-lectures section presented a different pattern, with 43.6% high quality, 51.6% medium quality, and 2.4% low quality. Figure 3 shows the differences between sections based on the quality of resources used. High ($Z=3.31$, $p<.001$), medium ($Z=-2.06$, $p<.05$), and low ($Z=2.24$, $p<.05$) quality ratings all show statistically significant differences between the sections.

Analysis of the references based on the type of resources used (Figure 4) shows a statistically significant difference between sections for use of periodicals ($Z=6.52$, $p<.001$) and Web resources ($Z=-6.50$, $p<.001$). The mini-lectures section exhibits more use of periodical sources, while the one-shot section used more Web resources.

Figure 5 shows the variation of types of resources used for each assignment in both groups. Each assignment shows a pattern very similar to the overall type of resources analysis. The students who received the mini-lectures show more variation in the types of resources used, while the students who received the one-shot lecture do not appear to have changed their information use patterns, consistently using mostly Web resources.

Figure 6 shows the differences between sections for the completeness of the references. The only statistically significant difference can be seen in the incomplete category ($Z=2.03$, $p<.05$) and may reflect differences between raters more than differences in student abilities. Librarians did not teach proper APA format, and identification of a reference as complete required only the presence of all elements of the reference, not full punctuation and formatting. For the majority of the assignments in both teams (55.7% JIT; 60.6%

one-shot), the students included all necessary elements for a complete citation.

Discussion

Results indicate that the presentation of information just prior to the completion of an assignment led to an increased number of high-quality resources being cited in student bibliographies. This supports the researchers' hypothesis. Those students who were exposed to the just-in-time sessions performed in a way that indicates that four 12-minute sessions throughout the term improves knowledge transfer of information literacy skills. While the same content was presented, the librarian offering the mini-lectures noted the ability for quick follow-up from the preceding assignment and a progression in the learning about library resources. While this practice generated a small difference in delivery, it was a natural outgrowth of repeated visits to the class and a desire from the students to understand why the sources for the preceding assignment were not adequate for the current assignment.

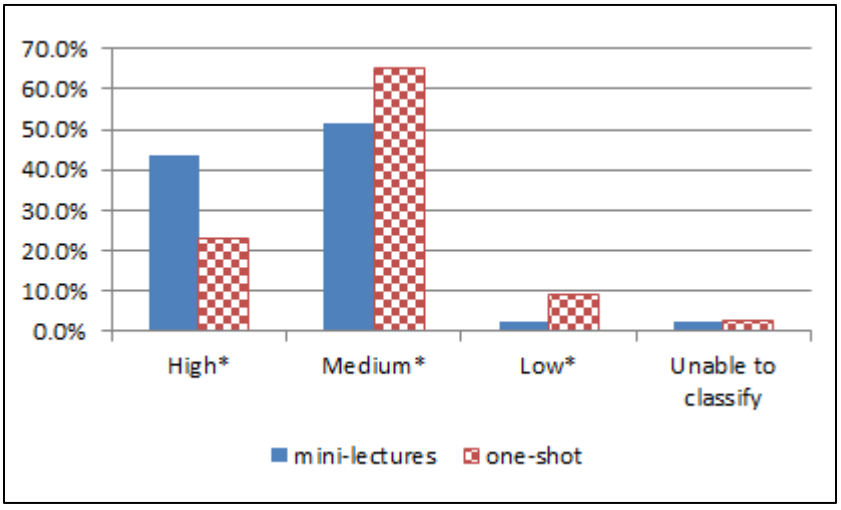

Figure 3
Quality of resources cited

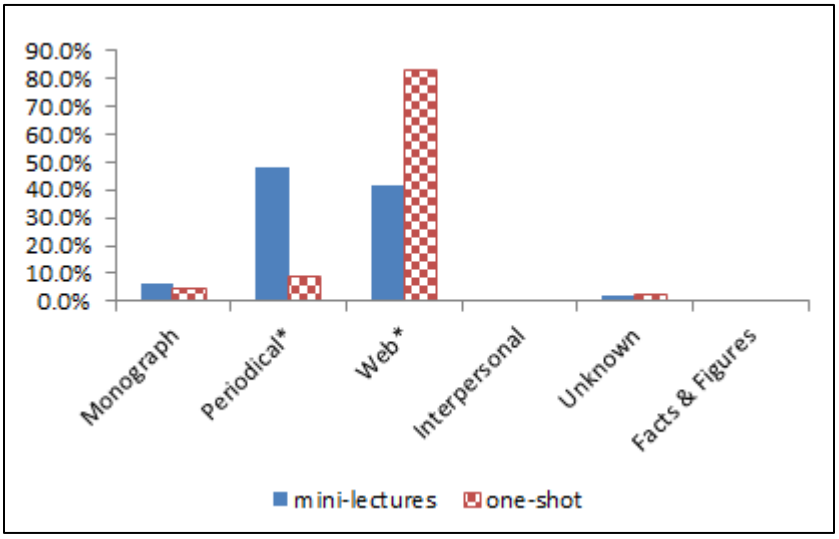

Figure 4
Type of resources

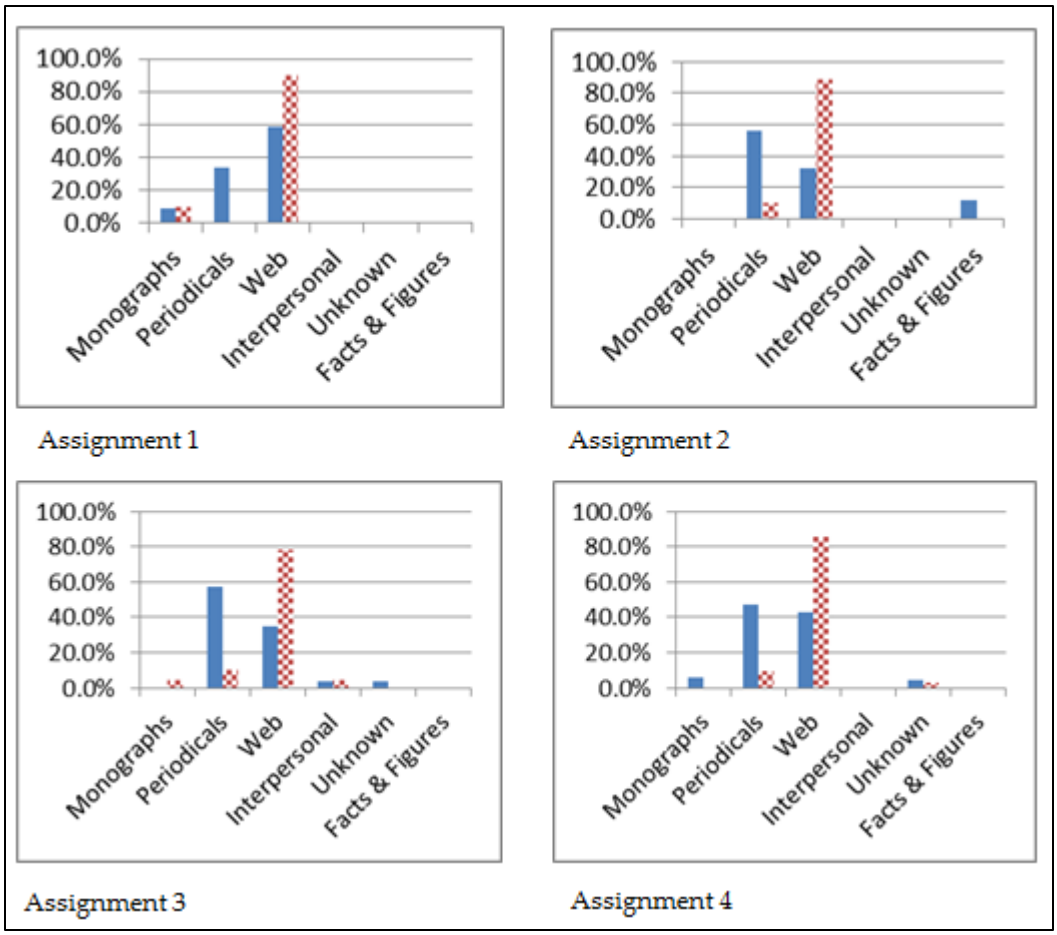

Figure 5
Types of resources used by assignment

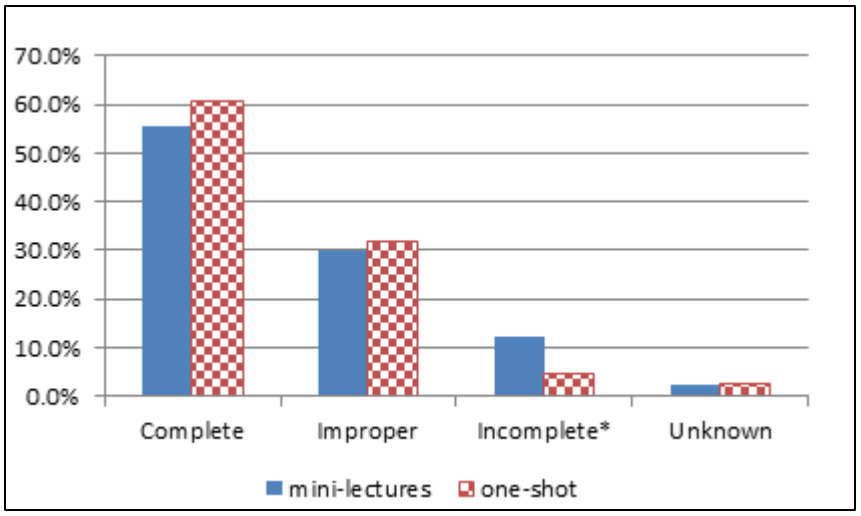

Figure 6
Completeness of references analysis

The fact that the primary learning goals of the course were not technical (i.e., a speech communications course) influenced the use of popular and informative resources (medium quality at 59.9%). The researchers were unsurprised by this result, particularly given the topic of assignment 3, the persuasive speech about a charitable organization. Researchers coded 93.4% of the resources as informative, while only a small percentage of the resources were coded as biased, even for the charity assignment, a likely situation for integrating biased information. Course instructors provided the grading and feedback returned to the students. Therefore, the authors have no indication of the content, quality, or consistency of feedback that students were given on practice of information literacy skills as evidenced in the outlines and bibliographies.

The analysis of the number of complete references per assignment revealed consistent patterns across sections of 50%-65% complete on all four assignments. Again, librarians did not teach reference formatting, and completeness simply signals that all the necessary components were present. The majority of complete references pattern holds even for the third assignment, where the necessary resources were mostly websites. The authors see this as an encouraging sign that students understand that more than just a URL is required to identify websites in citations.

Conclusions

The statistical analysis of student bibliographies indicates that the introduction of information literacy instruction for several brief lectures in conjunction with gateways or assignments in the curriculum improves outcomes. It cannot be determined if the changes in instruction model are the sole reason for observed variations, or if the section instructors impacted the outcomes through differences in teaching or grading.

This project presents intriguing possibilities for future research. A continuation of the study reported here within a different course, focusing on technical information, could explore if information literacy skills practiced in speech class are transferred into technical courses. Repeating a similar experiment, but using two or more sections of the speech class taught by the same instructor, could indicate the extent that instructor input impacts the outcomes of this experiment. Building upon the observation that the group speech had much higher-quality resources and more complete citations, a study may also investigate if the use of group work helps to improve the information literacy skills of the group as a whole.

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Appendix A
Description of Speech Assignments

Network Learning Community
COM 114 Speech Assignments

Speech #1: Informative
Length: 3-4 Minutes
Description: In this speech, you will present to the class about one of the top Engineering innovations of the 20th century. You will be given a list of topics from your instructor. You will explain to the class what the innovation was and what impact this innovation has had on the way that people live, work, or how we understand the world. This assignment will require a small amount of research, and each presentation must include two sources. This assignment emphasizes organization and delivery. It is important that you present the material in an appropriate organizational pattern for an oral presentation. You must have an introduction, body, and conclusion. This will help your audience understand and retain the information you provide. You also will be asked to pay specific attention to your delivery.

Speech #2: Informative
Length: 4-5 Minutes
Description: In this speech we will be focusing on how to report information to different audiences with differing levels of knowledge. For this assignment the class will be divided into groups of three. Each small group will be assigned a machine, process, or technological innovation works. Each individual in the group will also be assigned a target audience; fellow engineers, potential consumers, or high school juniors. Although the groups of three will have the same topic and will present on the same day, you do not need to collaborate on your presentations. Your task will be to explain how this machine, process, or technology works in a way that is appropriate for your target audience. This presentation must be based on at least 3 sources and use an appropriate organizational pattern and include a clear intro, body, and conclusion.

Speech #3: Persuasive
Length: 5-6 Minutes
Description: For this presentation you are going to persuade your classmates to support a charity or nonprofit organization by donation their time, money, or tangible goods. You are going to persuade your audience to volunteer or to donate money or other tangible goods. You will use a problem-solution format. First explain what the problem is and then explain why your audience should support the organization you chose to help that problem. For example, you might want to persuade your audience to donate blood. You would first talk about the problem which is the need for blood and possible blood shortages and then explain how being a blood donor can help solve that problem. You can also talk about the personal benefits one might get from supporting the cause you chose. These can be national or local organizations.

Speech #4: Group Presentation
Length: 30-35 Minutes
Notes: 1 typed sheet OR 1 4x6 notecard per person
Description: In this speech, you must take various concepts/products (a car, a computer, a home, a classroom, a restaurant, etc.) and completely RETHINK the object or space to make it more user-friendly and/or efficient. You must develop visuals of your new product so the audience can visualize it. Your audience for this speech is a venture capital firm, so be sure to "pitch" your product as well as you can.

Appendix B
Coding Framework for Speech Outlines

	Sub-Classification	Code	Definition	Description/Example
SECTION 1 - Information Source – Classification	Monographs	**BOOK**	Books	Provides in-depth details of specific topic or related group of topics.
		HNBK	Handbooks, Guides, and Manuals	Provides quick facts, formulas, equations and/or procedures
		STND	Standards	Provides standards and/or codes
		TXBK	Textbooks	Provides in-depth details of specific topic or related group of topics. Includes problem sets, intended for class use.
		ENCL	Encyclopedias	Provides overview of a wide range of topics
		DICT	Dictionaries	Provides definitions and word origins
		TECH	Technical Reports	Official reports published by government or public agencies
		PATN	Patents	Existing and/or pending U.S. or foreign patents.
	Periodicals	**NWSP**	Newspapers	*New York Times, Wall Street Journal, Journal Gazette*
		PMAG	Popular Magazines	*Good Housekeeping, People, Parents*
		TMAG	Trade Magazines	*Engineering News Record, Contracting Business*
		NMAG	News Magazines	*Newsweek, Time*
		JRNS	Journal Articles	*Journal of Solar Energy Engineering, Journal of Energy Resources Technology*
	Web Resources	**COM**	Commercial	Website published by commercial enterprises (i.e. ".com") *www.ge.com, www.lightingexpert.com*
		ENWS	News Organizations	Websites or broadcasts by non-print based news organizations *www.cnn.com, www.bbc.com, www.npr.org*
		GOV	Government Agencies	Websites or reports published by federal, state, local, or foreign government entities
		ORG	Non-Profit Organizations	Websites published by non-profit organizations *www.greenpeace.org*
		EDU	Scholarly Organizations	Websites published by educational entities *www.[university_name].edu*
		PERS	Personal	Websites authored by amateurs and non-experts (i.e. blogs, personal webpages, etc.) Includes personal space on ".edu" sites
		DMED	Digital Media	Digital images or videos

	Internal	**PEER**	Peers	Correspondence with peers
		EXPT	Experts	Correspondence with experts
		INVT	Stakeholders	Formal interviews with stakeholders
		SURV	Surveys	Formal or informal surveys developed by students
		OBSV	Observations	Measured observations recorded by students
		IMAG	Images	Photos and/or videos taken by students
	Unknown	**GWEB**	Generic Website	Citation that is clearly a Web Resource, but cannot be coded (e.g. broken URL)
		UNKN	Unknown	Citation is incomplete and cannot be classified
	Facts & Figures	**STAT**	Statistical Compilations	Published data sets
		PROD	Product Information	Third party or manufacturer data on produce specifications.
SECTION 2 - Information Source – Appropriateness	Sub-Classification	Code	Definition	Description/Example
	Audience	**SCH**	Scholarly	Journal articles, conference papers, textbooks, technical reports, etc.
		TECH	Technical Data	Data, product datasheets, product specifications, trade publications
		POP	Popular	Non-scientific / non-technical
	Purpose	**INF**	Informative	Information is provided with minimal bias (i.e. gives information to make informed decisions)
		BIAS	Biased / Persuasion	Information is advocating a particular idea or group of ideas from a biased perspective (i.e. give assertions of what is best)
		ENT	Entertainment	Information is meant for entertainment, not educational use
SECTION 3 - Information Source - Documentation	References	**RCOM**	Complete	Citation is given in a clear format with all necessary elements, such that **the original source is easily traceable**
		RIMP	Improper	Citation has one or more elements wrong (i.e. incorrect URL, etc.) but **the original source is ultimately traceable**
		RIMC	Incomplete	Information is cited, but missing crucial elements (i.e. title, publisher, URL, etc.) such that **the original source is not traceable**
		RMIS	Missing	No reference is given