

Title: Impact of Assignment Prompt on Information Literacy Performance in First-Year Student Writing

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Abstract

This study attempts to quantify the impact of assignment prompts and phased assignment sequencing on first-year student work. Specifically, whether more fully developed and “scaffolded” assignment prompts produced better Information Literacy (IL) in student papers (n=520). The examination of assignment prompts in relation to student IL rubric scores would seem to indicate the conventional wisdom on developing assignment prompts might not have an impact on IL performance.

Keywords

Assignment prompts; information literacy

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Introduction

Assignment design and consultation with disciplinary faculty is an area in which many academic librarians are involved (see, for example, Keyes & Barbier, 2013; Stone & Sternfeld, 2014). However, because librarians tend to be distanced from the final products of student labor, it can be difficult to know if assignment design has an impact on student work, especially work related to Information

¹ While the data analysis for this project was done at current affiliation addresses, the original paper collection and rubric analysis was done while all authors were at the Claremont Colleges Library, 800 N. Dartmouth Ave., Claremont, CA 91711, USA. M. Sara Lowe, Assessment Librarian; Sean M. Stone, Science Team Leader & Asian Studies Librarian; Char Booth, Director of Research, Teaching, & Learning Services; Natalie Tagge, Social Sciences Team Leader & Librarian.

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Literacy (IL) performance. In order to examine the effect of assignment design and librarian consultation on student IL performance, this study coded 42 assignment prompts from 54 first-year seminar courses among five undergraduate colleges and correlated the prompts to 520 student papers produced in those 54 classes. Papers were scored using an IL rubric (Appendix A). Results both confirm and challenge the literature on what constitutes a good assignment prompt and the benefits of sequenced assignments.

In a meta-analysis, Russell (2001) states that one of the factors impacting writing and learning in higher education are the “pedagogical tools that faculty provide (or don’t provide) students” (p. 261). In 2010, Project Information Literacy released the results of a study where researchers examined 191 assignment hand-outs to see how IL concepts (e.g., evaluation of sources, citation and plagiarism) were presented to students (Head & Eisenberg, 2010). They found the majority of assignments focused on mechanics (e.g., how many sources to use, APA citation style) rather than substantive or pedagogical information (e.g., how to develop a research strategy, why citation is important, how to find and evaluate sources). “The handouts had few specific details about finding and using sources, making the guidance that was provided often vague and inapplicable” (Head & Eisenberg, 2010, p. 3). The present study sought to examine two questions: one, if prompts within our sample were still more mechanical than pedagogical; and two, if that mattered. In other words, do prompts make a difference in the quality of students’ IL performance in their writing?

Literature Review

This literature review investigates the two areas related to the current study: sequenced assignments (also referred to as scaffolded assignments, where an assignment is broken into multiple, smaller assignments that progress in content and building complexity towards the final deliverable); and assignment design, including prompts and topic selection.

Sequencing Assignments

“The basis of a good writing course is a series of purposeful writing tasks” (Foster, 1983, p. 124). There are numerous examples in the literature that advocate for, and provide examples of, sequenced assignments (Collins & Moran, 1975; Kiniry & Strenski, 1985; Pytlik & Bergdahl, 1987; Sollisch, 1985; Walk, 2008). These sources are primarily focused on improving student writing rather than specifically addressing IL skills. Lindemann (1982) argues that effective writing assignments encourage students “to define progressively more complex rhetorical problems” (p. 205). Different studies have advocated for a variety of approaches to sequencing such as: in the context of students who are able to write persuasively but then do not write persuasively when tasked with writing a research paper (Bisson, 1981); corresponding to the intellectual development of the student (Roan, 1987); and situational sequencing in which writing assignments are connected in ways that allow students to apply what they have previously learned (Schuster, 1984). . L. Smith (1984) emphasizes the importance of the recursive nature of sequenced assignments, which if not done may lead a student to “mechanically get each small writing task over with, like a tedious exercise” (p. 460).

There is some literature advocating for sequencing of IL skills. Hovious (2015), in a blog post, notes the importance of sequencing research assignments. Bordonaro and Richardson (2004) write about a library education class which used a sequenced assignment approach; however, student gains were not statistically significant. Majetic and Pellegrino (2014) discuss a sequenced scientific literacy assignment to teach the connection between popular media and scientific literature, but results of student gains are anecdotal. While all of this literature can be helpful for librarians designing and developing their own instruction, the majority do not provide evidence that sequencing works to develop IL skills. One notable exception is Stevens and Campbell (2007) who introduced sequenced assignments in lower, intermediate, and upper-level Political Science courses and documented student gains via pre/post-tests and rubric-evaluated work. Overall, there is a gap in the literature of studies with proper assessment of student work to demonstrate the value of sequencing, particularly related to IL, hence the relevance of the current study.

Assignment Design (Prompts & Topic Selection)

What impact assignment design has on student writing has been the subject of much debate. Much of the assignment design literature focuses on the importance of identifying an audience to which students write, or rhetorical specification. In 1983, Brossell wrote, "There is almost no experimental research evidence to support the idea that full rhetorical specification assures essay examination topics that will elicit the writers' best writing" (p. 165). In 1990, Huot noted research attempting to establish a relationship between assignment prompt and writing quality was inconclusive.

A handful of studies have shown some relationship between prompt and writing scores or other aspects of writing. did a Studies of college students at all levels found those who received audience information received higher scores on their writing which in most cases were statistically significantly higher (Black, 1989) while first-year undergraduates who received audience information before writing did not score any higher than those with no audience information but, if given the information before revising their work, those with audience information did write better final essays than those with no audience information (Roen and Willey, 1988). However, Nussbaum, Kardash, and Graham (2005) in a study of undergraduate students found that those given more specific writing goals generated more counterarguments and rebuttals than the control group. .

Other researchers have found no significant relationship between prompt and scores. Gray (1982) attempted to measure the effect of two versions of a writing prompt on scores and writing processes among high school students' grades 10-12. He found that while differences in prompts affected aspects of the writing process, paper scores were similar between variations. Hoetker and Brossell (1989) found a topic with little rhetorical specification did not adversely affect poorer writers. Redd-Boyd and Slater (1989) gave undergraduate students one of three scenarios: imaginary reader, real reader, or no reader. When graded by both a set of readers and teachers, assigning an audience had a limited effect on reader's scores but no significant effect on teachers' scores. Woodworth and Keech (1980), in a study of

high school students, failed to find a difference in mean scores between students with three versions of prompts with varied degrees of audience and rhetorical specifications.

A study by Brossell (1983) produced interesting results relevant to the present analysis. The study consisted of three levels of rhetorical contexts (1=low, 2=medium, 3=high) to test the hypothesis that topics with more robust rhetorical contexts would help essay exam writers produce better essays than those given less information on a topic. What they found was that different levels had a discernable, but not statistically significant, effect on essay scores. Specifically, essays written at the highest level had lower mean scores than those written at the lowest and medium levels and those written at the medium level had higher mean scores than the low or high levels. At least in this area, too much information does seem to interfere with a student's ability to write well. Hoetker (1982) hypothesizes that "the more language and information students are given, the more difficult it seems to be for them to get beyond the language of the topic to discover what they may themselves have to say" (p. 386-87).

Oliver (1995) conducted another interesting study attempting to determine the relationship between topic, purpose, and audience in writing prompts studying 7th, 9th, 11th graders, and first-year college students. She found that with first-year students there were interactions between topic and audience. Prompts with either more or less specific information about both topic and audience resulted in writing that yielded higher scores than when topic and audience specificity varied in the prompt. "Results here indicate that a specific topic with a believable audience, or a very general topic without audience specification, provided students who have more experience and who pay more attention to rhetorical cues with a less confusing writing task" (Oliver, 1995, p. 435).

Topic Selection

Research in the area of interest and learning shows students who are interested in a topic persist longer and pay more attention than less interested students (Hidi & Anderson, 1992). W. Smith et al. (1985) found that advanced writers performed significantly better than average and lower-level writers when writing on open-ended topics.

Overall, the literature on the relevance of assignment design to student outcomes is limited but leans towards the design being irrelevant or insignificant to student outcomes. The present study is a robust analysis of a number of aspects of assignment design, some of which have never been addressed in the literature as it pertains to IL and student assessment.

Methodology

This study was undertaken at The Claremont Colleges in Claremont, California, which are a consortium of seven contiguous but independent institutions situated around a common Library. Total campus enrollment is approximately 7,000 across five liberal arts colleges (Claremont McKenna College, Harvey Mudd College, Pitzer College, Pomona College, and Scripps College) and two graduate universities (Claremont Graduate University and Keck Graduate Institute).

The authors worked with first-year seminar coordinators and campus assessment or institutional review officers to collect papers (n=520) and corresponding assignment prompts produced by Claremont Colleges students in first-year seminar courses over the 2013-14 academic year.³ These were standard introductory courses that, while covering a variety of topics, emphasize writing, research, and basic student skills. The first-year seminars culminated in some sort of written project with an assessable deliverable such as a research paper. Papers were received from 54 separate first-year classes taught by 47 professors (7 classes had two sections each). While the original purpose of the project was to assess first-year students' IL skills as well as the impact of library instruction and librarian assignment design collaborations on student learning (see Booth, Lowe, Tagge, & Stone, 2015 for pilot study results, and Lowe, Booth, Stone, & Tagge, 2015 for full results), because prompts were collected from 42 of the 54 classes, the authors had a ready-made sample to study the effect of assignment prompts on IL performance in student writing.

This project used the [LIBRARY NAME] IL in Student Work Rubric (2013-14) (Appendix A), adapted from an original produced at Carleton College (2014) in Northfield, Minnesota to evaluate the student paper sample (Jastram, Leebaw, & Tompkins, 2014). This rubric assesses three of five IL "Habits of Mind" (HOMs) in authentic student writing and other work: (1) attribution; (2) evaluation of sources; and (3) communication of evidence. Habits of Mind are defined by Costa (2008) as "having a disposition toward behaving intelligently when confronted with new problems... our most effective actions require drawing forth certain patterns of intellectual behavior." (p. 30) The rubric is a widely used evaluation instrument within the Claremont institutions, both undergraduate and graduate, that has been adopted for accreditation-level student assessment by several of the colleges. It features four evaluation levels: 1 = initial; 2 = emerging; 3 = developed; and 4 = highly developed. The rubric is designed to assess IL within any type of student output, regardless of discipline, format, or grade level.

Student name and course information was redacted and coded, and librarians conducted rubric-based evaluation of IL performance as exhibited in the papers. Prior to scoring, pairs of raters conducted a norming session to norm the rubric. Each pair read two identical sample papers and scored them separately using the common rubric, then met to discuss scores and come to agreement on applying rubric criteria consistently. Following the norming exercise, each team scored approximately 30 first-year papers. In total, n=520 papers were read and scored (not including the two norming papers). Overall, reliability between raters was moderate to strong indicating that pairs were scoring papers in predictably similar ways and introducing little bias into the qualitative analysis based in differences in grader interpretations.⁴

Assignment prompts were examined in the three rubric areas, as described above, for evidence of the following: for attribution, mention of a) citation style and b) plagiarism or academic integrity; for evaluation, a) the number of sources, b) the types of sources, and c) how to evaluate sources; for

³ Paper collection methodology approved by Claremont Colleges IRB.

⁴ Generally, a Cohen's Kappa score of <0.2 is considered poor agreement; 0.21-0.4 = fair; 0.41-0.6=moderate; 0.61-0.8 strong; more than 0.8 is near complete agreement.

communication, a) topic choice and b) paper structure. All of these areas (except topic choice) were ranked on the following scale: 0 = no mention/does not exist, 1 = mechanical, 2 = pedagogical, 3 = mechanical and pedagogical.

Simply put, mechanical prompts detailed *how* to do something, and pedagogical prompts expressed *why* to do something. Mechanical prompts contained language such as “double-spaced, 12 pt font, one-inch margins with endnotes.” Pedagogical prompts sought to instruct the student, for example, with the research process: “you can expect that you will be revising and refining your initial ideas as you find and gather relevant sources.” Pedagogical and mechanical prompts contained elements of both. For example, “your papers should be well written with a clear argument or interpretation that is supported by well-chosen and compelling pieces of evidence. Your grade will largely be determined by the imaginative quality of your thesis, as well as your ability to draw upon concrete evidence that relates to your interpretation. All papers must be typed, double-spaced, with page numbers on each page.”

This scale was developed in an attempt to test the assumptions in Project Information Literacy’s research assignment report, specifically that assignment handouts did not usually contain “substantive information that students also needed.” (Head & Eisenberg, 2010, p. 2) If substantive information is needed, then papers produced from prompts without this pedagogical information would theoretically score lower in IL skills than papers from prompts containing this substantive information.

Topic choice had two rankings: 1 = limited selection of topic, and 2 = students’ choice of topic. Additionally, prompts were examined for evidence of sequenced assignments (e.g., different parts of the research paper due at different times such as topic, research question, annotated bibliography, then final paper) and coded based on the scale: U = unknown, 0 = none, 1 = minimal, 2 = sequenced (scaffolded). [See Tables 1 and 2.]

Table 1 - Prompt categories and criteria areas

Categories	Attribution	Evaluation	Communication	Sequenced (Scaffolded)
Criteria Areas	<ul style="list-style-type: none"> Citation Style Plagiarism or Academic Integrity 	<ul style="list-style-type: none"> Number of Sources Types of Sources How to Evaluate Sources 	<ul style="list-style-type: none"> Topic Choice Paper Structure 	

Table 2 - Prompt criteria areas ranking system

Criteria Areas	Ranking System
<ul style="list-style-type: none"> Attribution (Citation Style; Plagiarism or Academic Integrity) Evaluation (Number of Sources; Types of Sources; How to Evaluate Sources) 	0 – No mention/non-existence 1 – Mechanical 2 – Pedagogical

• Communication (Paper Structure)	3 – Mechanical & Pedagogical
• Communication (Topic Choice)	1 – Limited selection 2 – Students' choice
• Sequenced (Scaffolded)	U – Unknown 0 – None 1 – Minimal (some sequencing) 2 – Sequenced

Prompt coding information was then linked to paper rubric scores in each class and aggregated among all classes with the same coding. For example, attribution – citation style – 0 (no mention); evaluation – number of sources – 2 (pedagogical). Analysis of correlations was on related rubric areas only (e.g., attribution rubric scores were examined for citation style, evaluation scores were examined for type of sources). The two exceptions were topic choice and assignment sequencing where all three rubric areas were analyzed because these areas have the potential to impact all areas of the paper.

Mean scores were calculated for all papers with prompts in each area. When examining individual class prompts, the mean score in each rubric area was calculated for each class. This was done in an attempt to make sense of the aggregate scores. Those classes with means less than 2.0 in any area were flagged as lower-performing classes. Classes with means of 3.0 or above in any area were coded as higher-performing classes. Prompts for those classes were examined for distinguishing characteristics.

Results

Attribution

In attribution, of n=47 professors,⁵ in both citation style and plagiarism/academic integrity there were no prompts that contained either pedagogical, or mechanical and pedagogical information. In fifteen (32%) of the classes, either there was no prompt available or the prompt was not complete and it was unknown if attribution was addressed. Reinforcing the findings of the Project Information Literacy assignment study, (Head & Eisenberg, 2010, p. 3) only four prompts (less than 9%) contained any mention of plagiarism or academic integrity, the other 27 (57%) contained no mention. Seven prompts (15%) contained no mention of citation style while 25 (53%) contained mechanical mention of it. This differs somewhat from the Project Information Literacy study which found 61% of handouts included information on proper citation style. [See Table 3.]

Table 3 - Attribution - percentage of prompts at each level

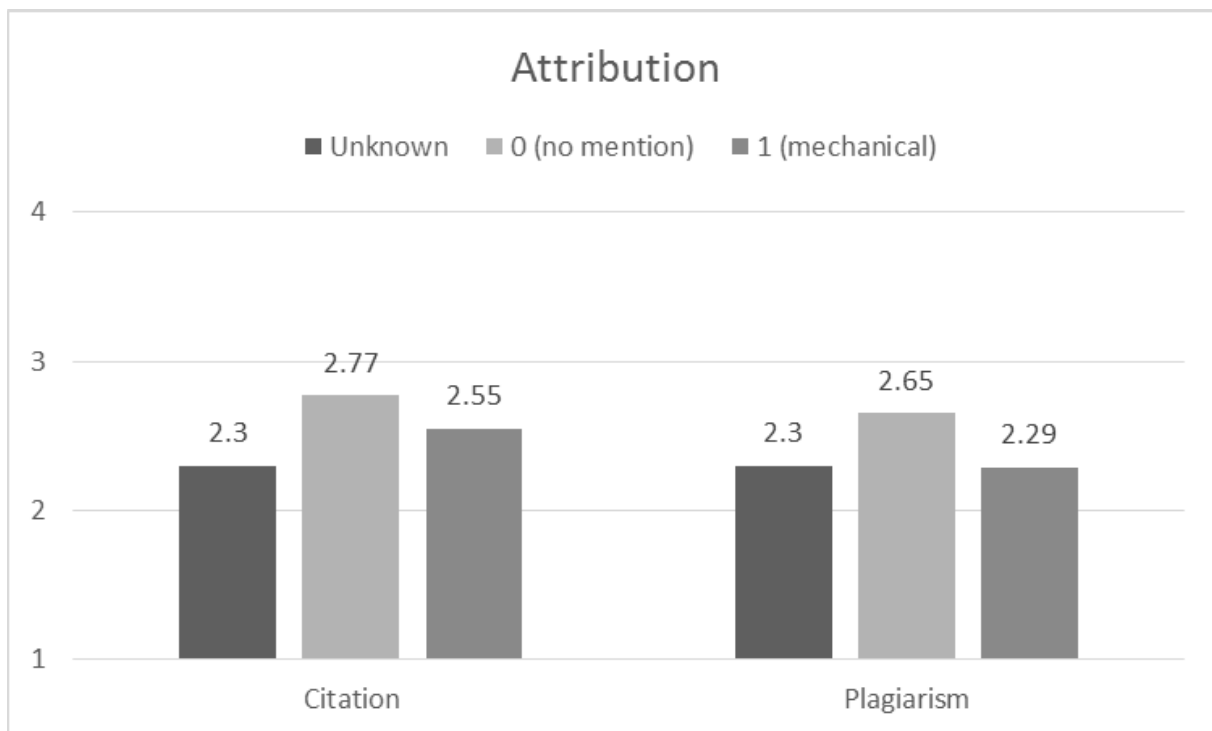
Attribution % of prompts at each level (n=47)		
	<i>Citation Style</i>	<i>Plagiarism/Academic Integrity</i>
U (Unknown)	32%	32%

⁵ 47 professors used a total of 42 prompts. Five prompts were used in two classes each. Since papers from classes were scored by class, not by professor, the sample size is 47, rather than 42.

0 (no mention/non-existent)	15%	57%
1 (Mechanical)	53%	9%
2 (Pedagogical)	0%	0%
3 (Mechanical & Pedagogical)	0%	0%

When mean scores are analyzed, the students writing in classes with no mention of citation style and plagiarism produced papers with statistically significantly higher means than those in classes with prompts emphasizing the mechanics and in classes where the authors were unable to get the prompts.⁶ [See Figure 1.]

Figure 1 - Attribution rubric scores by criteria



Evaluation

As with attribution, for fifteen of the classes either no prompt was available or the prompt was not complete and it was unknown if evaluation was addressed. Unlike attribution, there were prompts that contained pedagogical information. The majority of prompts for (1) number of sources and (2) type of sources contained mechanical information. Very few prompts provided any guidance on (3) evaluation of sources, findings supported by Project Information Literacy’s study (Head & Eisenberg, 2010, p. 13). [See Table 4.]

⁶ Citation: no mention versus unknown and no mention versus mechanical both had p-values < 0.01. Plagiarism: no mention versus unknown and no mention versus mechanical both had p-values < 0.01.

Table 4 - Evaluation percentage of prompts at each level

Evaluation % of prompts at each level (n=47)			
	Number of Sources	Type of Sources	Evaluation of Sources
U (Unknown)	32%	32%	32%
0 (no mention/non-existent)	13%	17%	47%
1 (Mechanical)	49%	38%	15%
2 (Pedagogical)	2%	2%	6%
3 (Mechanical & Pedagogical)	4%	11%	0%

In every area, papers in classes with mechanical emphasis of evaluation criteria had mean scores higher than in classes with no mention, pedagogical mention, or mechanical and pedagogical mention. Papers with no mention of any evaluation criteria produced papers with higher means than prompts with pedagogical or mechanical and pedagogical information. Finally, papers where we did not have access to the prompt had higher mean scores than in classes with pedagogical prompts.

With regards to the source number category, mean scores in classes with mechanical prompts had statistically significantly higher mean scores than those in classes where the prompt was unknown, pedagogical, or mechanical and pedagogical.⁷ Papers with prompts that had no mention of source number had means statistically significantly higher than those with pedagogical mention.⁸

Means for source type were statistically significantly different between mechanical versus pedagogical and unknown⁹ and no mention versus pedagogical.¹⁰ Source type was one area where a mix of mechanical and pedagogical information in the prompt resulted in mean scores that were comparable to no mention in the prompt.

Finally, with source evaluation, mechanical prompts produced papers with statistically significantly higher mean scores than those in every other area.¹¹ Papers in classes with pedagogical prompts had statistically significantly lower mean scores than in classes with no mention of evaluation in the prompt or in classes where no prompt was available.¹² [See Figure 2.]

⁷ P-values for mechanical versus pedagogical and mechanical & pedagogical were both < 0.01. Mechanical versus unknown was 0.01.

⁸ P-value < 0.05.

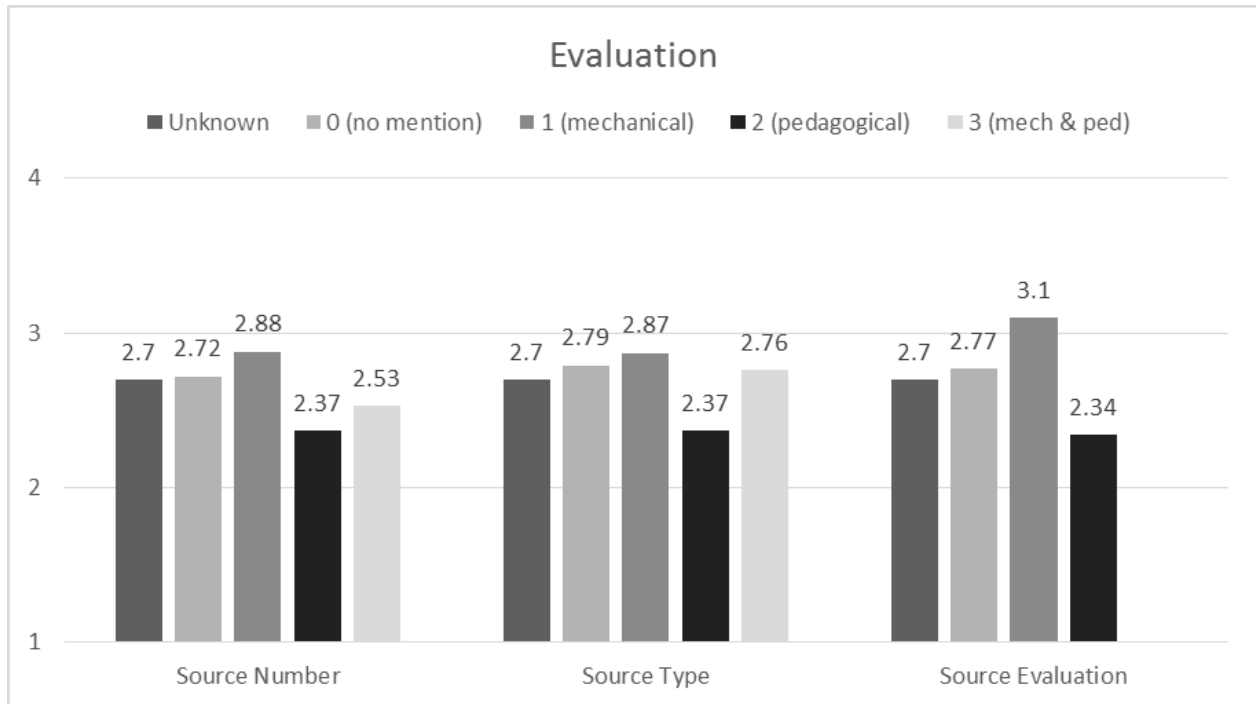
⁹ P-value mechanical v. pedagogical < 0.01; mechanical v. unknown < 0.05.

¹⁰ P-value < 0.01

¹¹ P-values mechanical versus all three other areas (unknown, no mention, and pedagogical) < 0.001.

¹² P-value pedagogical versus no mention < 0.001. P-value pedagogical versus no prompt 0.01.

Figure 2 - Evaluation rubric scores by criteria



Communication

For the structure of the paper, more prompts contained mechanical and pedagogical information than solely mechanical information. There were no prompts that contained only pedagogical information.

In the present study 45% of known prompts expected students to develop their own research topic, within the subject material covered in the course. [See Table 5.] This is in comparison to 54% of the assignment handouts in the Project Information Literacy study (Head & Eisenberg, 2010, p. 8).

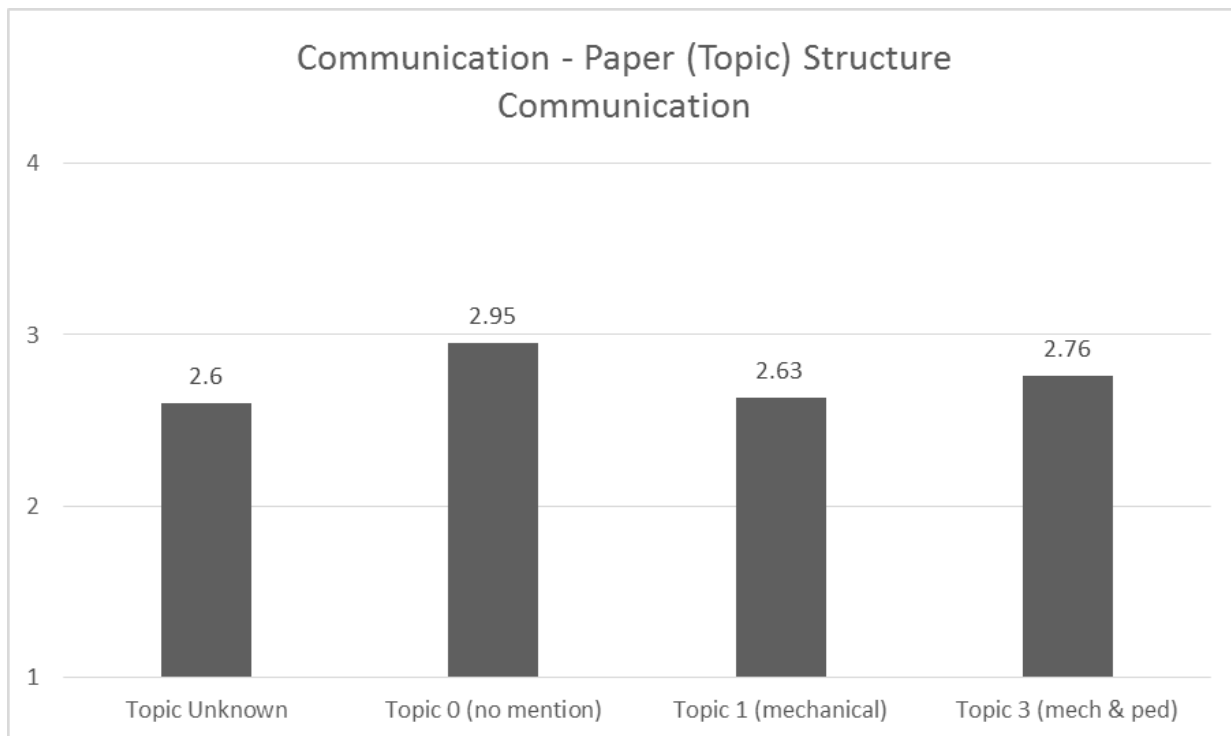
Table 5 - Communication percentage of prompts at each level

Communication % of prompts at each level (n=47)			
Structure		Topic Choice	
U (Unknown)	30%	U (Unknown)	32%
0 (no mention/non-existent)	11%	1 (Limited Selection)	23%
1 (Mechanical)	26%	2 (Students' Choice)	45%
2 (Pedagogical)	0%		
3 (Mechanical & Pedagogical)	34%		

When mean scores were analyzed in the area of paper structure, no mention produced papers with statistically significantly higher means than in all other areas: unknown, mechanical, mechanical and

pedagogical.¹³ Interestingly, however, mechanical and pedagogical prompts produced papers with statistically significantly higher means than mechanical prompts and where the prompt was unknown.¹⁴ [See Figure 3.]

Figure 3 - Communication Structure rubric scores by criteria



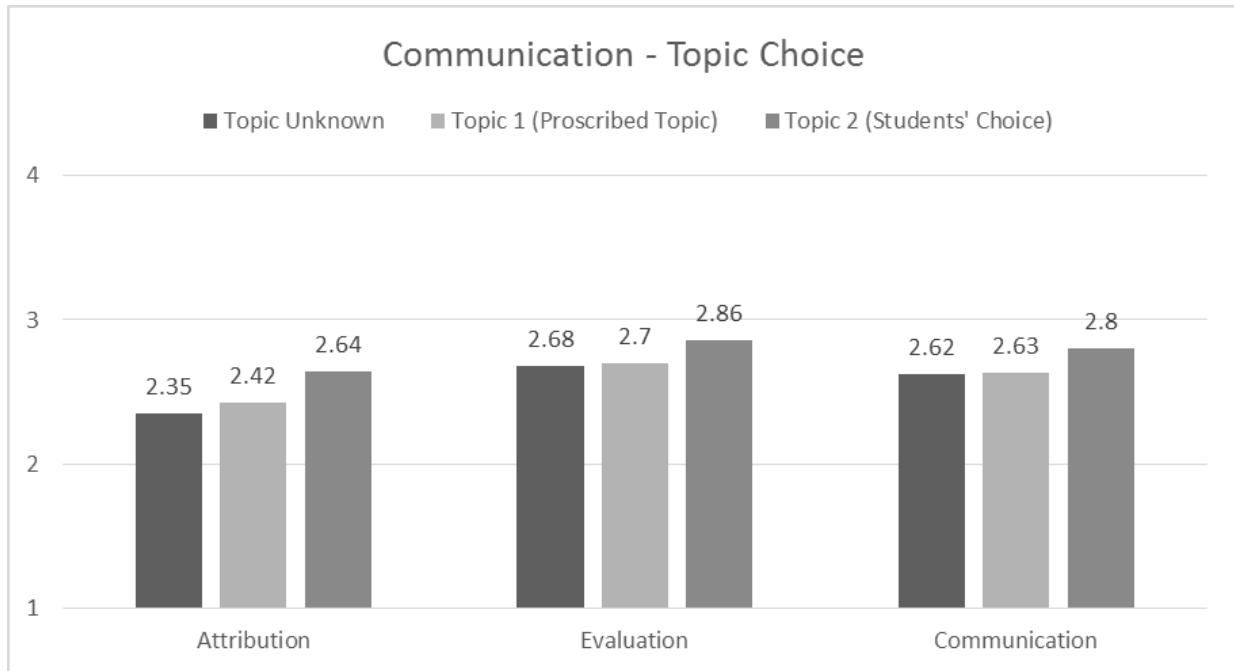
As mentioned above, all analysis to this point has only been on comparable rubric areas (e.g., only attribution scores were examined for citation style). However, topic choice was one of two criterion where all three rubric areas were analyzed because it has the potential to impact all areas of the paper. With topic choice a clear pattern emerges. Papers in classes where students could choose their own topic had statistically significantly higher mean scores in all three rubric areas than in classes where topic choice was proscribed or where it was unknown.¹⁵ [See Figure 4.]

¹³ P-values no mention versus unknown and mechanical were both < 0.001. P-value no mention versus mechanical & pedagogical < 0.05.

¹⁴ P-value mechanical & pedagogical versus unknown < 0.01. P-value mechanical & pedagogical versus mechanical < 0.05.

¹⁵ P-values Student Choice versus proscribed: Attribution 0.005; Evaluation < 0.05; Communication 0.01. P-values student choice versus unknown topic choice: Attribution < 0.001; Evaluation 0.01; Communication < 0.01.

Figure 4 - Communication Topic Choice rubric scores by criteria



Assignment Sequencing

Assignment sequencing (scaffolding) was the second area where all three rubric areas were analyzed, with the hypothesis that sequencing would have an impact on all areas of IL.

As mentioned in the literature review, there are a number of pedagogical writing texts that mention the benefits of assignment sequencing. In this study, of the 34 prompts which were sequenced, 65% (n=22) contained some sequencing, and 50% (n=17) were highly sequenced. [See Table 6.]

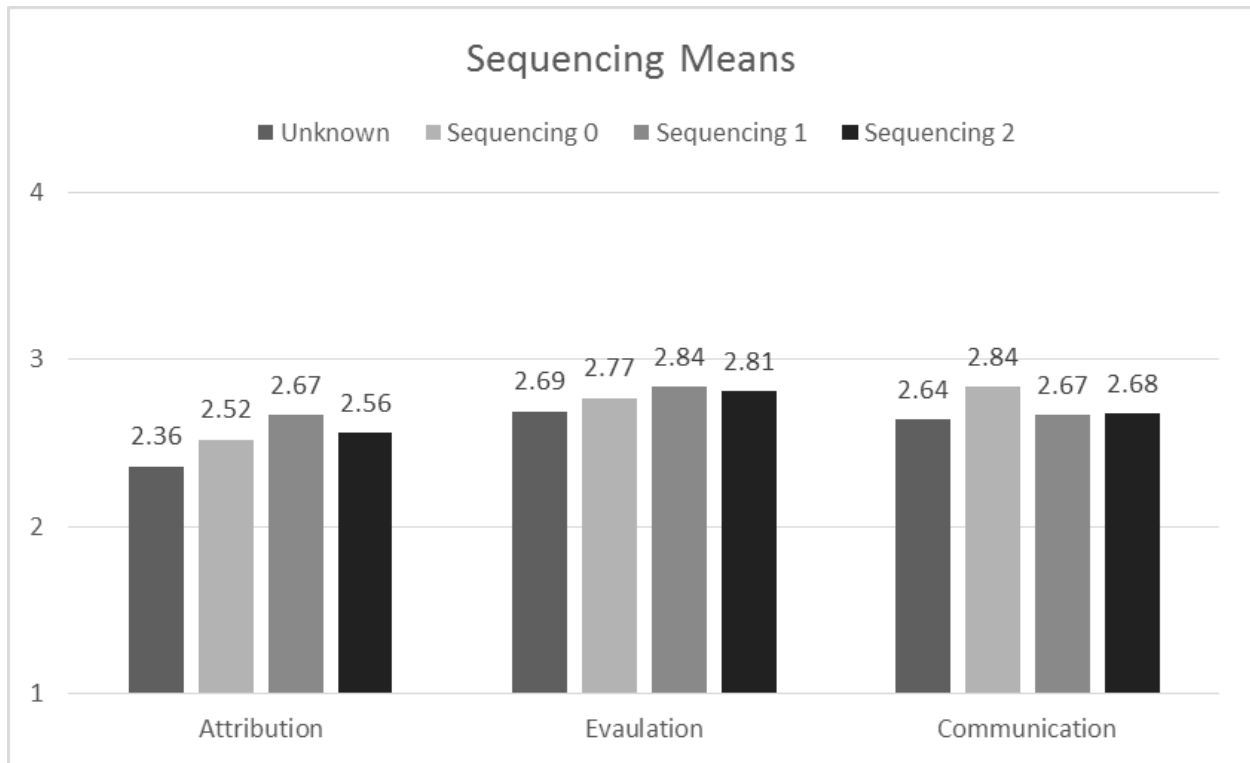
Table 6 - Sequencing percentage of prompts at each level

Sequencing % of prompts at each level (n=47)	
U (Unknown)	28%
0 (no mention/non-existent)	26%
1 (Minimal)	11%
2 (Highly Sequenced)	36%

Interestingly, in all areas, the most highly sequenced assignments did not have the highest mean scores. In attribution and evaluation, minimally sequenced papers had higher means than no sequencing and highly sequenced papers, although not statistically significantly higher. However, in communication, papers with no sequencing had statistically significantly higher mean scores than all other areas (unknown, minimal sequencing, highly sequenced).¹⁶ [See Figure 5.]

¹⁶ P-values 0.01.

Figure 5 - Sequencing rubric scores by criteria



Class Mean Scores

As noted earlier, scores for all three IL areas were on a four point scale (1=lowest; 4=highest). Analysis of individual class means identified two classes with means below 2.0 in all three areas of the IL rubric. Five classes had means below 2.0 in one area. For classes with means at 3.0 or greater, three classes had higher means in all three rubric areas, seven classes had high means in two of three rubric areas, 11 classes had high means in one of three rubric areas.

Prompts from both high and low mean classes were analyzed in an attempt to determine if there were elements that would translate into high or low student scores. When analyzing prompts that produced papers with high mean scores in all three areas there are no clear patterns. One prompt is a full single-spaced page, with detailed information, although not to the level of minutiae of the unsuccessful prompt. The other two prompts are only a paragraph, with minimal information on topic, length, citation style, and number/type of sources.

The authors received the prompt for one of two of the classes that scored below 2.0 in all three areas. This prompt seems to be too detailed. The topic is very specific, not a theme or subject, but a specific performance of a ballet. There are seven bullet points telling the student they must have "at least one paragraph in which...." they must provide different elements such as description, analysis, and

interpretation. Examining the impact of prompts on student Information Literacy scores, it appears too much detail in a prompt is worse than too little detail.

Discussion & Conclusion

Overall, in all areas of our analysis, results suggest that the less a prompt pedagogically discusses an IL Habit of Mind (HOM), the better the student scores. In all but one area, prompts containing more pedagogical elements produced student papers scoring lower than those with only mechanical elements. Only in Communication – Topic Structure did papers with pedagogical prompts score higher than mechanical, and that was still lower than paper scores from prompts with no mention of structure. One area that aligned with previous research is the impact of topic choice on student scores. Students who had their own choice of topic, within the confines of the topic of the course, performed much better than students who had to write on a proscribed topic.

Similar results were found with sequencing. Prompts with moderate sequencing produced better student scores than prompts that were heavily sequenced. This is somewhat troublesome as IL Habits of Mind are difficult to teach in “one-shot” sessions and learning that occurs at multiple points within the semester produces more information literate students. (For details on how the “one-shot” doesn’t lead to student IL gains like multiple contact points through the semester combined with faculty integration of IL competencies see [CITATIONS REDACTED FOR PEER REVIEW].) Our analysis shows that, perhaps not surprisingly, when developing student IL skills the assignment prompt is probably not the most influential element impacting student performance. Rather, it is the full suite of pedagogical tools the professor gives a student. There are number of meaningful interactions and activities that go into even the moderately sequenced class that could have significant impact on student learning outcomes. Faculty can impact a sequenced research project with one-on-one or group meetings in or outside of class, with class periods devoted to research or writing, embedding or including writing tutors or writing center resources as part of class. The inclusion of librarians in the equation could also impact students with factors such as: librarian presence in one or more class periods, inclusion in syllabus or assignment planning, inclusion in assessment of various research milestones, and production of asynchronous learning resources such as research guides or online tutorials. This is by no means an exhaustive list of what could go into a well sequenced class focused on research and IL learning and others certainly exist depending on the context of the course. This has important implications for librarians who teach. We are not always included in assignment and syllabus design. We are not always on the course LMS site. We are not usually present at every class, nor is that feasible or desirable. Figuring out where and how this pedagogy is taking place is the next logical step.

The results of this study are mostly contrary to the authors’ initial expectations, with the exception of the effect of paper topic choice. This seems to be counterintuitive to the logic that has governed much of our assumptions about learning complex concepts like IL. Why is this? One possibility is the importance of the student level in relation to the amount of scaffolding or sequencing that is occurring

throughout the semester. In this study, first-year students generally performed better with moderate levels of sequencing which, on the surface, seems odd but not necessarily when one thinks about the class from the student's perspective. High levels of scaffolding necessitate regular, almost constant, work on a single process aimed at a final goal such as producing a research paper. It is possible that such focused and continuous work is too much for first-year students who are new (or at least newer) to academic research at this level. While more advanced students with a higher tolerance for this kind of work may thrive in this sort of directed and intentional environment, first-year students could become fatigued and less likely to learn and perform well over the course of the many milestones planned in the highly sequenced class. The essence of why they are learning what they are learning may become lost in the ongoing, complex process.

Taken individually, the differences observed within the various components of IL and prompts may be surprising but potentially not unexplainable. There is the possibility that research prompts may be of very limited value and the "real" direction for assignments is coming from other points in the course. Prompts that try to do too much, particularly in introductory courses, may actually be counterproductive while more generalized or non-specific prompts are actually more effective, possibly when combined with other methods tangential to or further into the research project. Professors with overly detailed prompts could potentially rely on them to introduce concepts that should be covered in class and might assume too much of students. In our analyses, mechanical components generally result in better outcomes in students when compared to pedagogical ones. Again, this could be an artifact of the student level and experience and not indicative of overall effectiveness of the methods. It is not difficult to imagine that first-year students, who have limited experience in scholarly research, would actually benefit more from knowing the "hows" of proper research rather than the "whys." In other words, knowing the mechanics of something like evaluation of sources is conceptually something that first-year students can and do benefit from but understanding the philosophy of evaluation may be too much and result in confusion without the proper grounding and context that comes with experience. It is entirely possible students with less experience could actually be hindered (at least in the short term) by pedagogical explanations and expectations for IL components such as communication.

The other issue are cases where a complete lack of addressing an IL issue gives better results in student outcomes when compared to either mechanical or pedagogical discussions. This could be the result of there being not only higher expectations but any expectations at all in an assignment prompt. Students using prompts that had no mention of attribution at all, for example, were essentially "off the hook" when it came to producing a finished product with a properly formatted bibliography and citations. For these students, any bibliography that was reasonably consistent would score higher on the IL rubric than students who made even minor errors in assignments guided by prompts that gave mechanical explanations requiring a given citation style. For those students, the bar is inherently higher and slight deviations in citation style would be major errors when compared to the same performance in projects governed by prompts with no prescribed attribution expectations.

This is a complex issue with a number of factors involving the student, faculty, librarian, assignment, and class when it comes to IL instruction. We can say that the prompt is related to student outcomes in some unexpected ways. While the option of topic choice produced predictable results, other aspects of assignment prompts and IL components seemed to relate to student outcomes in ways that were opposite to expectations and common practice. It is important for us and others to continue this work and look at these various factors both in isolation as well as in combination to better understand how they affect student learning.

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