Reducing Drag: Instruction Collaboration in a Senior Capstone Laboratory Course

Amber Janssen, Instruction Librarian
William Tsai, Assistant Professor

California State University, Maritime Academy

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Presentation Learning Outcomes

Participants will be able to:

- Identify non-traditional learning activities that require information literacy skills in order to target specific courses for instruction.

- Choose appropriate assessment tools in order to build iteration into their instruction solutions.

Agenda

1. Using the Design Thinking Process

2. Inspiration and Ideation

3. Reflection

Background

Problem Definition

Inspiration
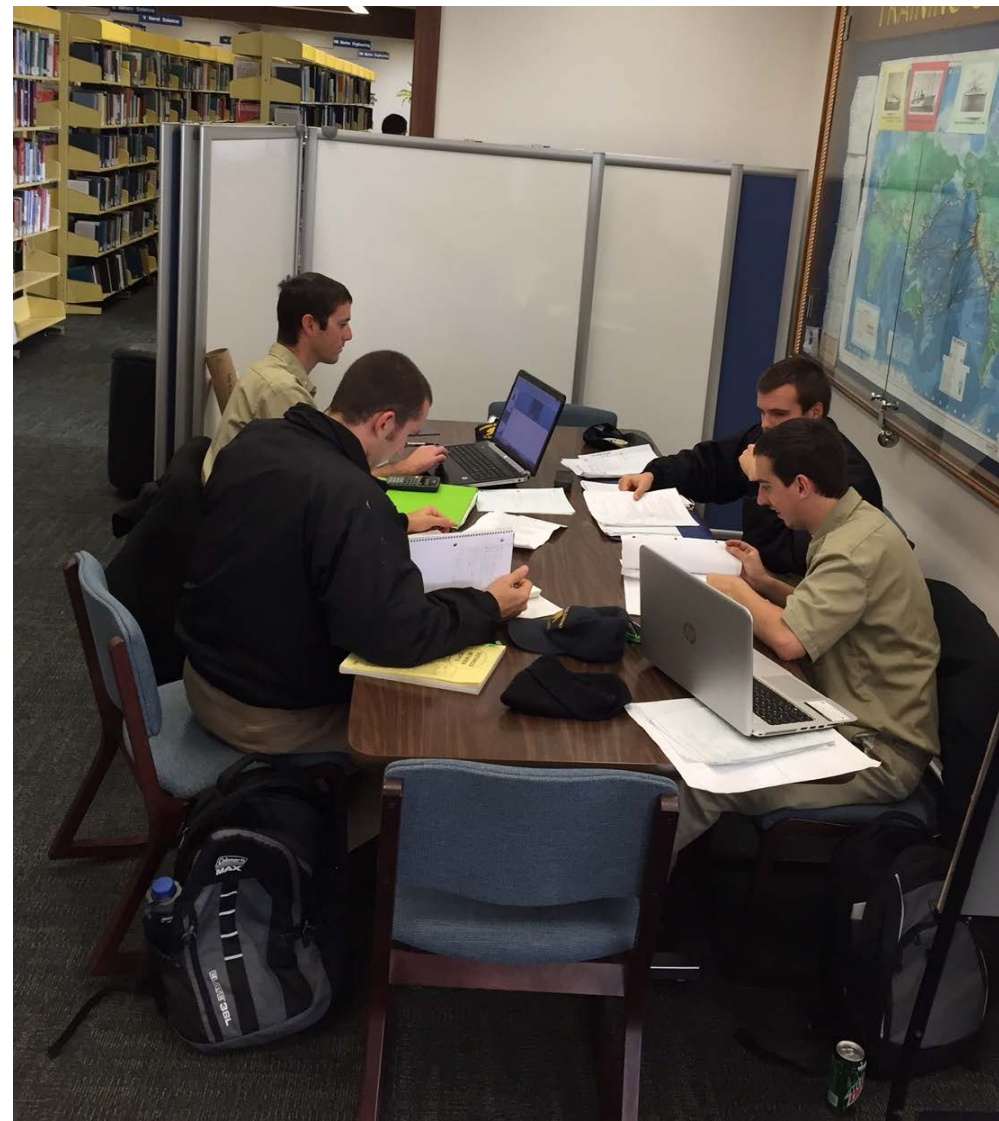
Ideation

Iteration

Cal Maritime (CSUM)
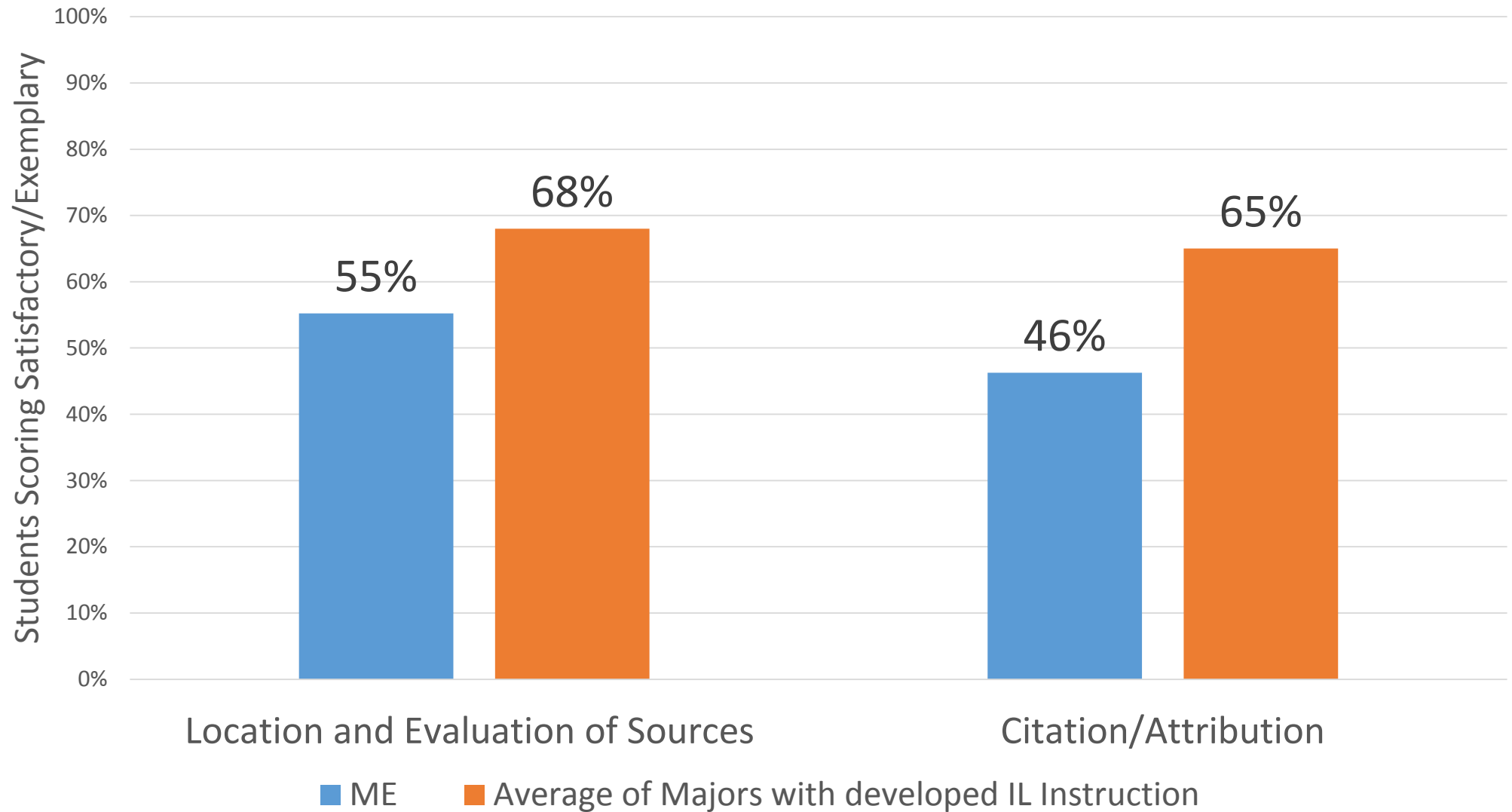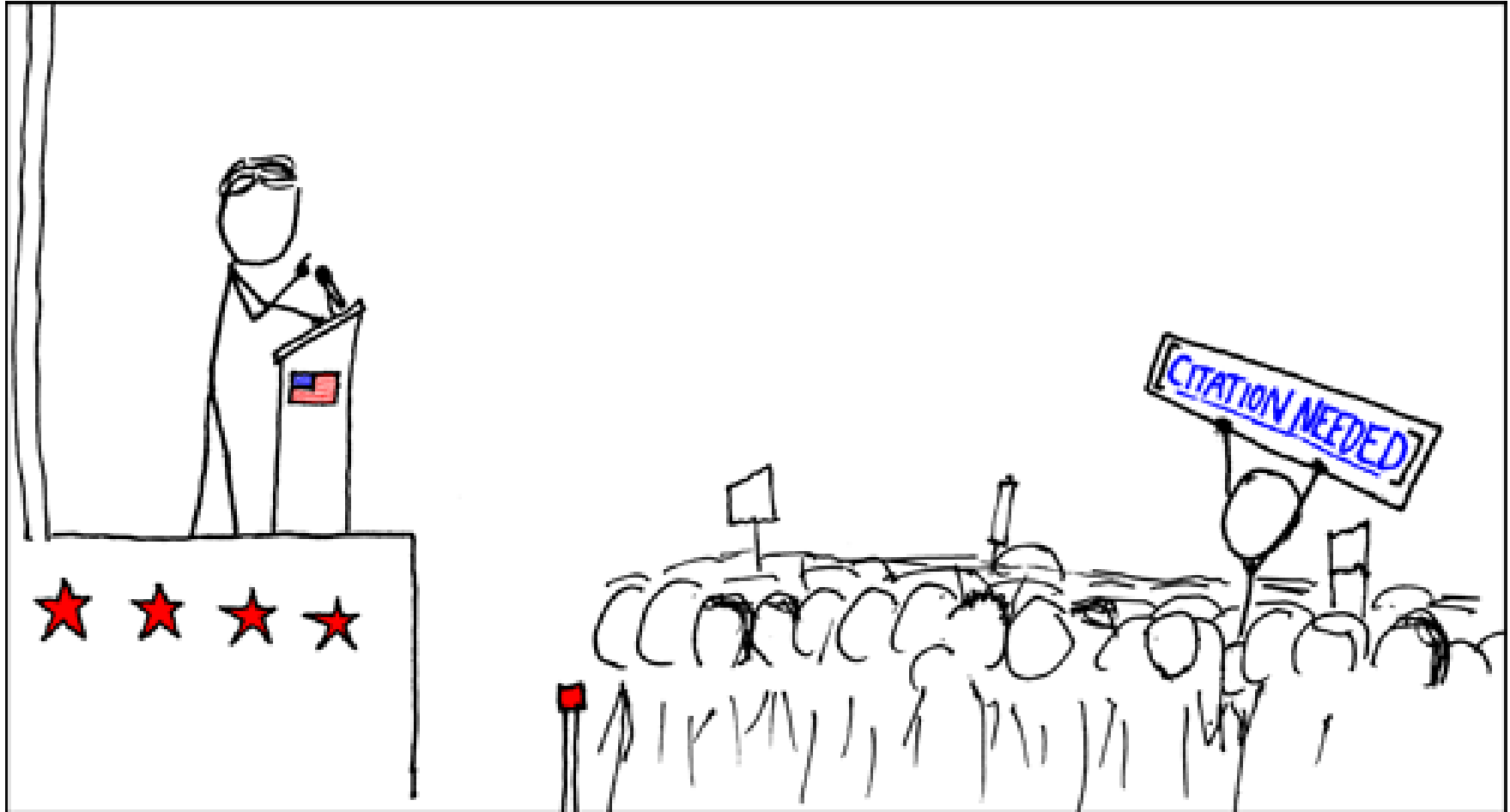
CSUM Mechanical Engineering

CSUM Library

Institution-Wide Assessment (2017)

ME349 Lab Reports

Munroe, R. (2007). Wikipedian Protestor. Retrieved from www.xkcd.com/285. CC BY –NC 2.5

ME349 Lab Reports

- Trouble differentiating between the different types of sources, including the use of non-peer-reviewed materials, such as websites;

- Lack of assessment of the quality of reference material;

- Lack of familiarity with how to use technical papers;

- Few references when writing the theory section of their lab reports;

- Improper use of citations in writing; and

- Lack of use of library resources during the literature search.

ME349 Lab Reports

Figure 2.1: Visual of Stall

Bibliography

"F48." F48. NASA. Web. 12 Nov. 2014.
<http://history.nasa.gov/SP-367/f48.htm>.

"Moodle Page of Prof. Tsai"
https://moodle.csum.edu/pluginfile.php/198207/mod_resource/content/0/Aerodynamics%20Lab%201.pdf

"Pressure Coefficient"
https://en.wikipedia.org/wiki/Pressure_coefficient

"Lift Coefficient"
https://en.wikipedia.org/wiki/Lift_coefficient

"Stall (fluid mechanics)"
https://en.wikipedia.org/wiki/Stall_(fluid_mechanics)

ASEE Conference Proceedings

If the Engineering Literature Fits, Use It! Student Application of Grey Literature and Engineering Standards

Chelsea Leachman, Washington State University

Chelsea Leachman is the engineering librarian at Washington State University. She obtained here Masters of Library and Information Science from the University of Wisconsin-Milwaukee in 2011. She has background in science and engineering. She received her Bachelor of Science in Environmental Science with a minor in geology from the University of Idaho 2007.

Prof. Jacob William Leachman, School of Mechanical and Materials Engineering, Washington State University

Jacob Leachman is an Assistant Professor in the School of Mechanical and Materials Engineering at Washington State University (WSU). He initiated the HYdrogen Properties for Energy Research (HYPER) laboratory at WSU in 2010 with the mission to advance the Technology Readiness Level (TRL) of hydrogen systems. He received a B.S. degree in Mechanical Engineering from the University of Idaho in 2005 and a M.S. degree in 2007. His master's thesis has been adopted as the foundation for hydrogen fueling standards and custody exchange, in addition to winning the Western Association of Graduate Schools Distinguished Thesis Award for 2008. He completed his Ph.D. in the Cryogenic Engineering Laboratory at the University of Wisconsin-Madison in 2010 on the visco-plastic flow of hydrogenic materials for the fueling of fusion energy machines. He has conducted guest research in the Physical and Chemical Properties of Fluids Group at the National Institute of Standards and Technology (NIST), and the Pellet Fueling of Fusion Plasmas Group at Oak Ridge National Laboratory (ORNL).

Session# 1793

Integrating Information Literacy Skills into Engineering Courses to Produce Lifelong Learners

Barbara Williams[a], Paul Blowers[b], Jeff Goldberg[c]
[a]Univ. Lib./Chem. & Env. Engr./[c]Systems & Industrial Engr.
The University of Arizona

Abstract

One criterion of the Accreditation Board for Engineering and Technology (ABET) is that engineering students must develop lifelong learning skills in order for a program to be accredited. We argue that developing information literacy skills will allow students to exert more control over their own learning within and beyond the classroom so they will develop these skills.

We have developed several methods of injecting information literacy skills seamlessly into engineering courses so students will see the value of being able to find information on their own. These activities incorporate discussions on peer reviewed materials, the appropriateness of using the Web for gathering information, and databases common to a core discipline. Pre- and post-implementation evaluations by sophomore, junior, and senior engineering students from two different engineering disciplines show that the incorporation of information literacy skills strengthens students' understanding of how to find and use information in engineering contexts. Future work would investigate whether students are indeed becoming lifelong learners by surveying their use of library information tools after they graduate.

Introduction

In this work, we advocate for the systematic inclusion of information literacy (IL) across the undergraduate engineering curricula to meet the Accreditation Board for Engineering and Technology (ABET) requirement for "teaching lifelong learning skills"[1]. Our previous paper[2] showed that IL skills can be seamlessly included in engineering courses by modifying assignments and adjusting syllabi. We showed that treating the IL skill set as an after-thought marginalized the concepts of both lifelong learning and information literacy. Much of the discussion in our previous work centered on technical strategies for transferring information literacy skills by impacting the course syllabi. In this discourse, we show more examples of how to integrate IL into engineering courses while also reporting more assessment data. We also provide an in depth argument about how IL skills contribute to lifelong learning skills.

We attempt to create a parallel learning process by infusing information literacy with regular course work. This particular teaching methodology teaches information literacy skills using the class content in a way that makes the literacy point with out appearing contrived. Research studies indicate that learning which is directly related to real life situations where the

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1677: TRAINING UNDERGRADUATES IN THE BROADER CONTEXT RESEARCH ENTERPRISE

ell, University of Wisconsin - Madison

ne, University of Wisconsin - Madison

What we discovered

Where the information is

National Technical Reports Library

Where students look
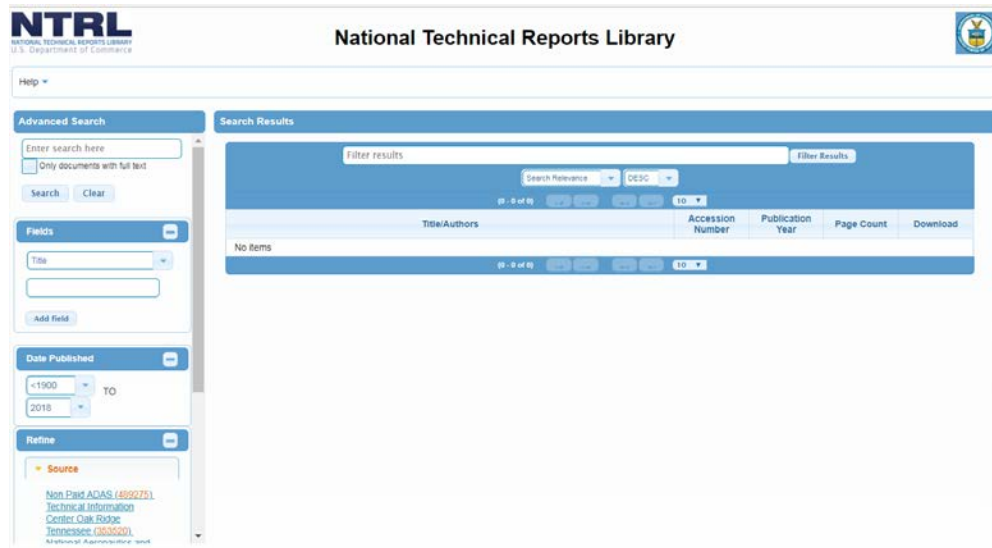
Google

the perfect source for my paper

Google Search   I'm Feeling Lucky

Learning Outcomes

● Trouble differentiating between the different types of sources, including the use of non-peer-reviewed materials, such as websites; ● Lack of assessment of quality of reference material; ● Lack of familiarity with how to use technical papers; ● Few references when writing the theory section of their lab reports; ● Improper use of citations in writing; and ● Lack of use of library resources during the literature search.

1. Students will be familiar with appropriate information formats and sources in order to complete the theory section of their lab report.

2. Students will be able to create correct AIAA citations in order to ethically use information in their lab reports.

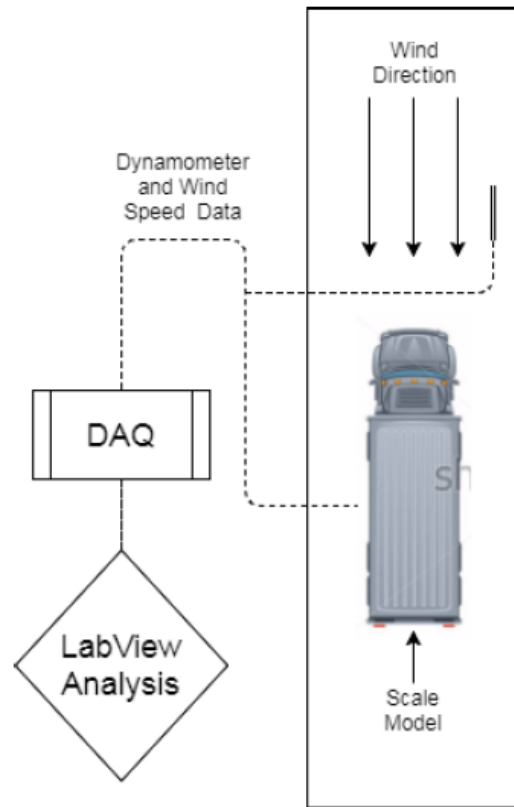# Assessment: Research Practice Survey

11. How challenging are the following activities for you?

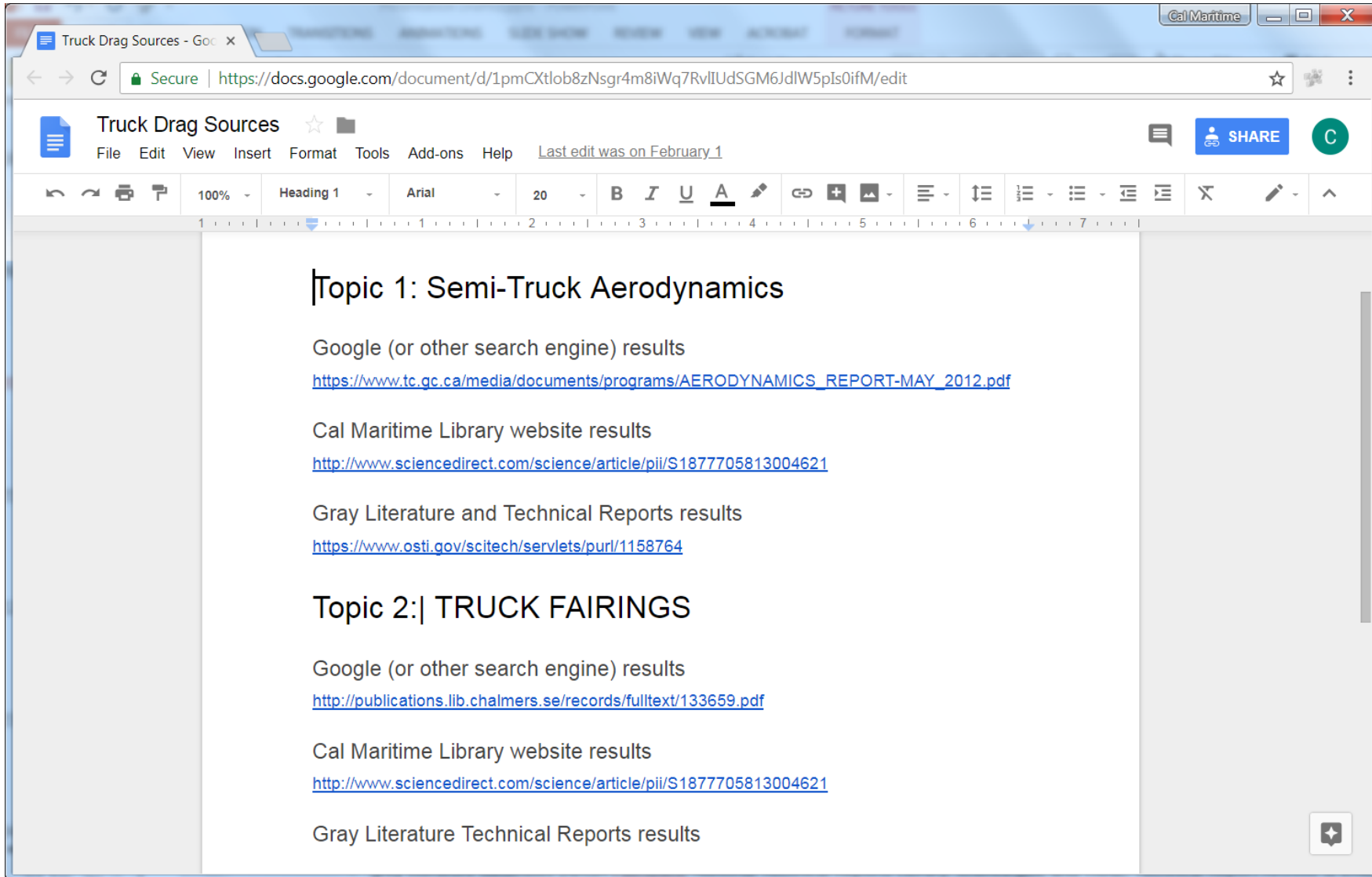|	Very easy	Somewhat easy	Somewhat difficult	Very difficult	No experience
Using a library catalog (whether print or online)					
Using a database (JSTOR, Academic Search Premier, ScienceDirect, etc.)					
Using an Internet search engine					
Locating physical items in the library					
Obtaining full text of online sources					
Determining whether a source is credible and appropriate for an academic project					

Assessment: Rubric

	None (0)	Beginning/Emerging (1)	Developing (2)	Proficient/Competent (3)	Exemplary/Strong (4)
Quality of Sources	Unable to differentiate between relevant and irrelevant information sources. Sources are mostly from general websites. For example: Uses webpages exclusively.	Sources cited are not clearly related to the topic, and/or show very little breadth, i.e. many sources are from the same journal or web site or are from very general web sites and/or non-refereed articles. Reliability, validity, accuracy, authority, purpose, currency, and relevance are not considered. For example: Uses at least one technical report, journal article or book. Some webpages are not industry appropriate	Is able to find some relevant sources, but includes irrelevant sources in the bibliography. Rarely evaluates information for reliability, validity, accuracy, authority, purpose, currency, and relevance. Many sources are not authoritative. Sources not balanced. For example: Uses at least one technical report, journal article or book. All webpages are industry appropriate	Demonstrates the ability to distinguish between relevant and irrelevant information (based on the topic). Does not always evaluate sources for reliability, validity, accuracy, authority, purpose, currency, and relevance. Sources not always balanced. For example: Uses only technical reports, journal articles and books as sources. Uses at least one of the information types.	Able to analyze information sources based on reliability, validity, accuracy, authority, purpose, currency, and relevance as demonstrated through sources cited in the bibliography. Sources are balanced and mostly authoritative resources. Uses only technical reports, journal articles and books as sources. Uses at least two of the information types.
Access and Use Information Ethically	Does not cite sources.	Fewer than 3 references are listed or listed references are not cited in-text.	3-5 references are listed, but not all are cited in-text.	3-5 references are listed and all are cited in-text, but some or all are not in required format.	3-5 references are listed in required format and are cited properly in-text.

New Lab Assignment

Library Instruction: Technical Report Searching

Library Instruction: AIAA Citations

Improvement!

- Quality of Sources Used

	Pre	Post	Change
Test	1.5	2.1	0.6
Control	1.3	1.5	0.2

- Ethical Use of Information

	Pre	Post	Change
Test	2.5	3.1	0.6
Control	1.8	2.5	0.7

Fall 2018

Drag lab being kept as a permanent part of the course

- Topic was effective in encouraging research

- Based on results, keep the search exercise as is

- Modify citation instruction

- Additional emphasis on presentations in addition to written reports

Information Fluency Program Changes
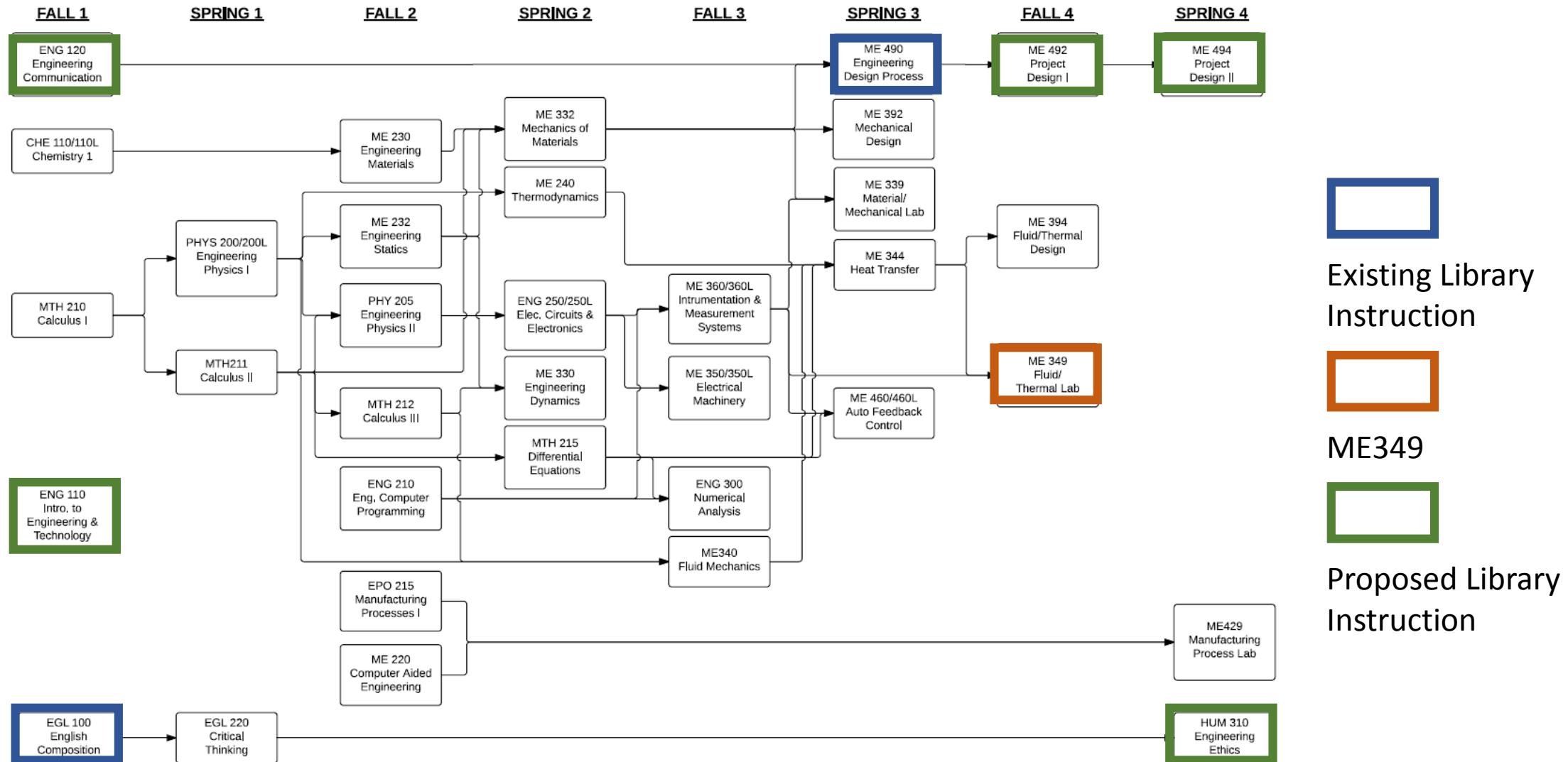
Questions?

Inspiration & Ideation

In groups:

1. Select a class where library instruction is not expected.
   - Why is not expected?
   - Why would it be useful or well-suited for this course?
2. Write an information literacy learning outcome for the course.
3. Create an assessment plan for learning outcome

Report Back

Caveats

- Methods here are a suggestion and not a guaranteed approach
- CSUM is a small school, so collaboration amongst faculty of different departments is common
- Librarians at CSUM are tenured/tenure-track faculty and therefore have opportunities to participate in curricular conversations

Recommendations

- Assessment activities, like accreditation, are a good way to network with other faculty and identify areas of concern
- Consider working with faculty relatively new to a course as they develop their course materials
- Similarly, junior faculty are still developing their teaching philosophy and may be more receptive

References

HEDS research practices survey. Retrieved from https://www.hedsconsortium.org/heds-research-practices-survey/

Information literacy VALUE rubric. (2014). Retrieved from https://www.aacu.org/value/rubrics/information-literacy

Tsai, W., & Janssen, A. (2018). *Reinforcing Information Fluency: Instruction Collaboration in Senior Capstone Laboratory Course.* Presented at the 2018 ASEE Annual Conference & Exhibition, Salt Lake City, UT.

Inspiration at CCLI

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected.
   - Why is it not expected?

     Civil Engineering
     MSE 304

   - Why would it be useful or well-suited for this course?

find & evaluate value

2. Write an information literacy learning outcome for the course that you can share with the course instructor.

   Students will be able to locate relevant economic sources, e.g. market data

   Students will become familiar with key economic resources and their value, *articulate*
   identify

   Students will be able to use economic sources to contribute to an engineering problem.

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

Civil Engineering
CSU Northridge
https://catalog.csun.edu/academics/cecm/programs/bs-civil-engineering/

Lower Division Requirements

CE 101/L. Introduction to Civil Engineering and Lab

Freshman orientation course for the Civil Engineering program, the profession and an introduction to the University. Introduction to the tools for civil engineering studies: Internet, word processing and spreadsheets. Development of communication skills and the ability to work in teams. Development of learning skills in civil engineering studies.

CE 280/L. Computer Applications in Civil Engineering and Lab

Development of computer skills related to the field of civil engineering. Introduction of Windows, email and Internet usage. Introduction to Office suite, word processing, spreadsheets with VBA applications, presentation and publishing software. Development of programming skills. Application of CAD to the development of structural and architectural drawings, dimensioning, grading plans, contour lines and sections. Analysis and design of structural systems using structural engineering packages. Development of algorithms and computer codes for the solution of civil engineering problems.

Upper Division Requirements

CE 315/L. Construction Engineering and Lab

The objective of this course is to introduce undergraduate students to planning, scheduling, estimating and project-control techniques for construction projects.

MSE 304. Engineering Economic Analysis

Systematic evaluation of the economic benefits and costs of projects involving engineering design and analysis. Economic decision making in an environment of limited resources and uncertainty. Present economy, the economy of multi-year projects, selection among competing independent alternatives, sensitivity of outcomes to input parameters, before and after tax analyses, replacement economy, inflation and breakeven analysis in production environments are discussed.

CE 408/L. Surveying with GPS Applications and Lab

Surveying with Global Positioning Systems (GPS): point positioning, differential positioning, differencing techniques, survey planning, real-time kinematic (RTK) surveys, vertical positioning, random errors and survey specifications, horizontal curves, vertical curves, horizontal control and vertical control.

CE 488A/L. Civil Engineering Senior Design I and Lab

First semester of a two-semester sequence capstone design experience simulating professional practice in civil engineering. (CE 488A and CE 488B must be completed within the same academic year.) Undertakes the preliminary design of a complex engineering project. Addresses ethics of engineering practice, professional lifelong learning requirements, written and oral engineering design project presentations and methods of technical problem solving.

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected. Civil Engineering : CE 408 Lab
   - Why is it not expected?

   Survey, a they seem to only concentrate on existing technology

   - Why would it be useful or well-suited for this course?

   - How I ethical consideration case studies;

2. Write an information literacy learning outcome for the course that you can share with the course instructor.

   Students will be able to use find studies that discuss GPS Students will be able to find high quality studies about GPS

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

   Compare pre + post library instruction

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected.
   - Why is it not expected?

   No explicit writing or research component, Practice-oriented, lots of guest speakers, off-campus visits, hands-on practice exercises.

   - Why would it be useful or well-suited for this course?

   Useful to discover literature of field + keep abreast of new developments. Interdisciplinary fields which students must know how to keep up with.

2. Write an information literacy learning outcome for the course that you can share with the course instructor.

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected.
   - Why is it not expected?

   Because will only concentrate on GPS use

   - Why would it be useful or well-suited for this course?

   Application to consider in the real world. Ethical considerations, tracking for wrong reasons. Working with actual cases of GPS use.

2. Write an information literacy learning outcome for the course that you can share with the course instructor.

   Find examples of using GPC ethically + not. Use stats, articles for a presentation to illustrate ethical/unethical use. Strategic searching other than Google. Students talk about the ethics of using GPS information.

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

   Compare (pre test) what they find on their own vs. after library session.

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

   Begin + end of semester/quarter or before & after library session

Art History Survey

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected.
   - Why is it not expected?

     Surveys are deliberately broad. Assignments are summative, not usually research-based.

   - Why would it be useful or well-suited for this course?

     — provide some context for what they learn in class
     — give who's producing the information?
     — intro. to the kind of research they'll do in the future

2. Write an information literacy learning outcome for the course that you can share with the course instructor. *information source*

   — students will be able to locate, relevant to their discipline.
   — students will ~~evaluate~~ identify forms of scholarship in this field.

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

     Reflection Papers

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

     end of semester

Inspiration and Ideation

Library Instruction in New Learning Contexts

1. Select one course from the course descriptions provided where library instruction is not expected.
   - Why is it not expected?

EDUC 450 Art & Learning "teaching art" & "in" practice
"curriculum planning for
in hands-on art making"

   - Why would it be useful or well-suited for this course?

Help students prepare to show worth of
art classes in K-12

2. Write an information literacy learning outcome for the course that you can share with the course instructor.

Part A : Develop art curriculum according
to syllabus
Part B: Show ability to quantify
the value of art to constituency

3. Create an assessment plan to measure the success of your learning outcome.
   - What type of instrument or tool would you use? (survey, rubric, observation, etc.)

Faculty post course survey

   - When would you perform the assessment? (during instruction, immediately after instruction, end of semester, etc.)

end of semester