RAPID PROTOTYPING
ACTIVE LEARNING
Aligning Your Favorite Teaching within the Framework
Designing a system by mocking up an initial prototype, testing it, making minor improvements, and then creating the next version quickly.
**Goals**

- Reduced development time
- Improved quality

**RAPID PROTOTYPING**
• New to Penn State
• Background in Computer Engineering
• Liaison to Math and Stats
TIM RELUGA, ASSOCIATE PROFESSOR
MATHEMATICS
THE PENNSYLVANIA STATE UNIVERSITY

• New to Penn State
• Second time teaching Discrete Mathematics
• Disappointed with student work from the last time
“Planned Laboratory Topics
We will have several laboratories during the class. Some of which will be meeting in a campus computer lab and make use of the python programming language to learn to these computations. Classes meeting in computer labs will be announced in class and on the web”
Math 311w-01 Lab 3: Information

http://www.libraries.psu.edu/psul/researchguides/physcmath/math.html

How can you trust information you find on the Internet? Where can you find an answer that is detailed enough to be useful, but not too complex for you to understand? Since anyone can publish information instantly on the World Wide Web distinguishing quality information can be very difficult.

Before the coming of the information age, there were only a few options for research — books, magazines, and scholarly journals.

Scholarly journals (also called academic, peer-reviewed, or refereed journals) are the traditional method of communicating new scientific discoveries. Authors generally submit their articles to several other scientists for review and comment, and these reviewers must approve the article before it is published. Since the audience is other scientists, the language used is highly technical and specific to the field. Scholarly journals are one type of primary source for research.

Primary sources are newly created or recorded knowledge by a scholar or researcher. These can be scholarly journal articles, scientific reports or even an in-person presentation. Secondary sources review, discuss, or analyze primary sources and are written later. Some examples of secondary sources are encyclopedia articles, science news reports, and most books.

Both types of information sources may have citations, references to earlier research. Citations in a primary source are an acknowledgement of previous research and give a link between earlier knowledge and the current study. Citations in a secondary source indicate where the author got the information they used to write their review of the topic.

For this lab, work in groups of two at each computer. Take notes on what you find on the back.

1. Visit the Wikipedia article for RSA Cryptography (http://en.wikipedia.org/wiki/RSACryptosystem) and go to the Notes, References and External links. Since this article is a secondary source, these are the many information sources used to create it. Identify the type of information source (scholarly journal article, book, etc.) for each of the five references on the back of this worksheet.

2. For each of the five, evaluate it on the following criteria:
   a. Authority — who is the author and what is their level of expertise
   b. Audience — who is the article written for and at what level is the article written
   c. Currency — how recent is the article and does that matter?
   d. Content — could you understand and use the article for a paper in this class?

3. Now go to Lirnsearch (http://psu.lirnsearch.serialsolutions.com) and find a scholarly article on RSA Cryptography that you think has high quality in those four criteria and cite it below.

References

Menezes, Alfred; Paul C. van Oorschot; Scott A. Vanstone (October 1996). Handbook of Applied Cryptography.

External Links


NOTES


2. SIAM News, Volume 36, Number 5, June 2005

1. I used library resources to research some of my assignments in this class. (YES / NO)

2. If you answered YES to #1, list the library resources that you used. (e.g. books in the catalog, magazines, newspapers, articles from Lionsearch, articles from MathSciNet)

3. The library instruction that I received this semester caused me to be more critical of websites & other information sources that I use for assignments. (YES / NO)

4. The Library Instruction I received this semester helped me better understand how to find and use library resources. (YES / NO)

5. It was easy for me to find the library resources that I needed for my assignments in this class. (YES / NO)

6. If you used library resources, do you feel that they helped you to achieve a higher grade on your assignments? (YES / NO) If not sure, please explain.

7. Do you have any additional comments?
RESULTS AND CONTROL GROUP

More critical of websites
- Lab: 71%
- Control: 48%

Instruction helped me use library resources
- Lab: 96%
- Control: 70%
This helped me realize the usefulness of the library research I mainly used Google Scholar

...library resources will be used more as I get into higher-level courses.

I use the library for the class book and study

RESULTS AND CONTROL GROUP
Observations during the lab

- Students frequently asked “what are we doing again?”

Review of the completed work

- Only half of the students completed question #3, searching on their own

Incremental changes

1. Increased time spent introducing the library website and the lab assignment
2. Reduced the number of citations for the students to evaluate
Math 311w Library Assignment

http://www.libraries.psu.edu/psu/researchguides/physiccmath/math.html

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For this lab, work in groups of two at each computer. Take notes on what you find on the web.

1. Visit the Wikipedia article for RSA Cryptography http://en.wikipedia.org/wiki/RSA_%28algorithm%29 and go to the Notes near the bottom of the page. Since this article is a secondary source, these are the many information sources used to create it. Identify the type of information source (scholarly journal article, news report, book, etc.) for each of the three references on the back of this worksheet.

2. For each of the three, evaluate it on the following criteria:
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   b. Audience - who is the article written for and at what level is the article written
   c. Currency - how recent is the article and does that matter
   d. Content - could you understand and use the article for a paper in this class

NOTES

   a. Authority
   b. Audience
   c. Currency
   d. Content

2. SIAM News, Volume 36, Number 5, June 2003
   a. Authority
   b. Audience
   c. Currency
   d. Content

   a. Authority
   b. Audience
   c. Currency
   d. Content

References

Now go to Lionsearch (http://psu.lib.psu.edu/lionsearch) and find a scholarly article on RSA Cryptography and cite it below.
RESULTS

More critical of websites

- Lab: 88%
- Control: 78%

Instruction helped me use library resources

- Lab: 93%
- Control: 72%
Observations during the lab

- Students still asked “what are we doing again?”

Review of the completed work

- Student answers from Lionsearch of poor quality, almost always the first result

Incremental changes

1. Introduced assignment and concepts in a discussion with examples.
2. Asked students to email an example from Lionsearch
Math 311w Library Activity

Visit the Wikipedia article for RSA Cryptography [http://en.wikipedia.org/wiki/rsa_algorithm] and go to the Notes near the bottom of the page. Find each document and answer the questions below.

NOTES
   a. Audience - Who could read this article? How advanced are the mathematics?
   b. Currency - How recent is the article? Does that matter?
   c. Content - Could you understand and use the article for a paper in this class?

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The information literacy lab
Version 2.0

Added a prompt for each question

Now more of a worksheet than a stand-alone assignment
I already had a library help session so I was already up to date.

I really enjoyed the session. I had never used a library resource before.

RESULTS
“Don’t throw out the baby with the bathwater”

- Changes resulted in reduced outcomes

Most students have had a previous library session

- See the course within the larger curriculum

LESSONS LEARNED
ACRL FRAMEWORK FOR INFORMATION LITERACY FOR HIGHER EDUCATION

- Authority
- Scholarly conversation
- Value of information
ACRL FRAMEWORK FOR INFORMATION LITERACY FOR HIGHER EDUCATION

- Authority
- Scholarly conversation
- Value of information

Wikipedia page for RSA now only has 1 reference!
New Topic: Goldbach’s conjecture
- Recently “proven”
- Discussion online
- Long history

Authority – identify authors and relationships
Scholarly conversation – find sources and currency
Value of information – see limited access to some

THE NEXT STEP
1. ^a^ b Weisstein, Eric W., "Goldbach Number", MathWorld.
2. ^a^ "Goldbach conjecture verification",
4. ^a^ Correspondance mathématique et physique de quelques célèbres géomètres du XVIIIème siecle (Band 1), St.-Petersburg 1843, S. 125–129.
5. ^a^ http://www.math.dartmouth.edu/~euler/correspondence/letters/OO0765.pdf
6. ^a^ Weisstein, Eric W., "Goldbach Conjecture", MathWorld.
7. ^a^ Ingham, AE. "Popular Lectures" (PDF). Retrieved 2009-09-23.
24. ^a^ Proof that an infinite number of primes are paired - physics-math - 14 May 2013
Rapid Prototyping Active Learning: Aligning Your Favorite Teaching within the Framework

http://sites.psu.edu/sciencelibrarian/2015/06/30/rapid/

Research (define your learning outcomes)

Design (plan your approach to the class)

Prototype (sketch out a learning activity)

Implementation (write a plan for using the activity)

Evaluation (plan your assessment)

Framework for Information Literacy for Higher Education

http://www.ala.org/ala/standards/ilframework

Threshold Concepts in Plain English by Ellyssa Stern Caboy (ellyssa@psu.edu)

Scholarship as conversation: Scholarship is a “discursive practice” where users and creators “come together to negotiate meaning.” The expert (and the student) seek out “many perspectives” on a specific topic.

Research as inquiry: Inquiry is “a process that focuses on problems or questions within a discipline or between disciplines that remain unresolved.”

Authority is constructed and contextual: The information need determines the level of authority required (context). It is constructed from community to community, as different communities recognize different types of authority. This is a deeper recognition and understanding of authority that goes beyond superficial indicators of authority such as type of publication, or author credentials. User as authority is an interesting Practice that emerges from this TC.

Information creation as a process: The quality and utility of information can be determined by the process that went into creating the information. Ask students to consider the process that goes into formulating and creating a tweet vs. a peer reviewed article.

Searching as Strategic Exploration: Searchers learn about their resource to better understand it and search across different resources and modes of access.

Information has Value: Information is a commodity, and information users have responsibilities as consumers and creators. Information production is impacted by political, social, and economic issues. One’s online presence has value, not just to the user but to others, and their data can be monetized by companies they use.
Math 311w Library Assignment

http://www.libraries.psu.edu/psu/researchguides/physcimath/math.html

Authority – identify authors and relationships

Scholarly conversation – find sources and currency

Value of information – see limited access to some

For this lab, work in groups of two at each computer. Take notes on what you find on the back.

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https://www.linkedin.com/in/johnmeier1

THANK YOU!