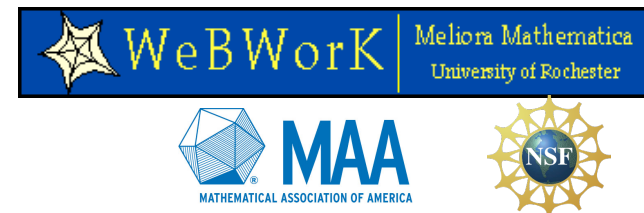# Embedding WeBWorK problems anywhere

January 16, 2020
"Developments, Directions and Experiments in OER"

Michael E. Gage
University of Rochester

2016 JMM original concept

- At the 2016 JMM in Denver I ended my talk on connecting WeBWorK and Moodle with an example of embedding WW problems independently in an html page.

- My plan was to present this stand alone page to my second semester calculus class as an overview/sample of what they were in for.

- https://demo.webwork.rochester.edu/public/features/05embedded_questions/

- local 2016_01_JMM_Seattle_mth162_overview copy.md file also available

Iframe for first problem

```
<iframe  width="800" height="600"
src="https://demo.webwork.rochester.edu/webwork2/html2xml?
    &answersSubmitted=0&
    &sourceFilePath=Library/FortLewis/Calc1/06-01-
Antiderivatives-graphically/AF1/AF1.pg&
    &problemSeed=123567&
    &courseID=daemon_course&
    &userID=daemon&
    &course_password=daemon&
    &showSummary=1&
    &displayMode=MathJax&
    &problemIdentifierPrefix=102&
    &language=en&
    &outputformat=sticky">
</iframe>
```

Developments since 2016
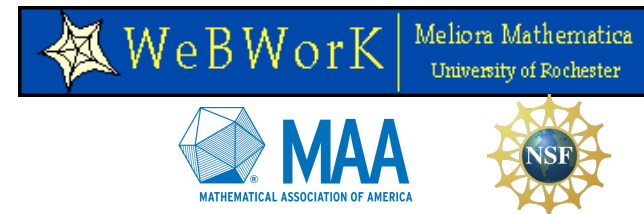
- Since then interest in using this embedding technique to embed homework problems in OER textbooks has taken off.

  - ActiveCalculus

    - Matt Boelkins — speaking Friday in the WebSIGMAA

  - PreTeXt - AIM

    - Alex Jordan, David Farmer, Rob Beezer

  - LibreTexts

    - Delmar Larsen,

  - Paul Seeburger — various materials

  - Future: connect WW to edX

    - Nathan Wallach - Technion

Formative vs Normative use cases

- Formative activity - Anonymous - No grades recorded

- Normative activity - grades are recorded

Both are possible using features of WeBWorK that have been around for at least 4 years. It is exciting to see newer, more effective and more elaborate "front ends" emerging which take advantage of WeBWorK's (specifically PG's) back end capability.

This talk will explain the simplest implementations of what is possible to make clear the range of "back end" features available.

Formative

```
<iframe  width="800" height="600"
src="https://demo.webwork.rochester.edu/webwork2/html2xml?
       &answersSubmitted=0&
       &sourceFilePath=Library/FortLewis/Calc1/06-01-Antiderivatives-graphically/AF1/AF1.pg&
       &problemSeed=123567&
       &courseID=daemon_course&
       &userID=daemon&
       &course_password=daemon&
       &showSummary=1&
       &displayMode=MathJax&
       &problemIdentifierPrefix=102&
       &language=en&
       &outputformat=sticky">
</iframe>
```

- Information required:

    - path to problem (the same as in the homework set editor)

    - problemSeed

- Url is: https://mySite/webwork2/html2xml?

- The course can be any course (often daemon_course) on the site

- The user can be any user in the course with permission login_proctor

# Formative/anonymous use case — many rendering sites
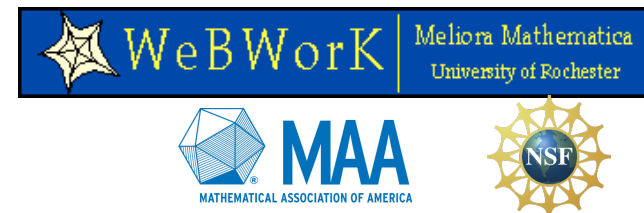
- Examples

  - demo.webwork (course:daemon_course, user daemon)

  - aim-ptx.aimath.org (course: anonymous, user anonymous)

  - demo.webwork.rochester.edu/webwork2 (course:UR102, user profa)

  - file: 2020JMM_part1a.md

Alternate inputs and outputs

```
<iframe  width="800" height="600"
src="https://demo.webwork.rochester.edu/webwork2/html2xml?
        &answersSubmitted=0&
        &sourceFilePath=Library/FortLewis/Calc1/06-01-Antiderivatives-graphically/AF1/AF1.pg&
        &problemSeed=123567&
        &courseID=daemon_course&
        &userID=daemon&
        &course_password=daemon&
        &showSummary=1&
        &displayMode=MathJax&
        &problemIdentifierPrefix=102&
        &language=en&
        &outputformat=sticky">
</iframe>
```

- Using different input source encoded in the textbook using base64

  - No library is needed.

  - ~~sourceFilePath~~ problemSource = ….base64 code….

- Use different output formats on server to customize presentation

  - 'sticky', 'simple', 'standard', 'json', …..

- file: part1b

Summative example —record grades
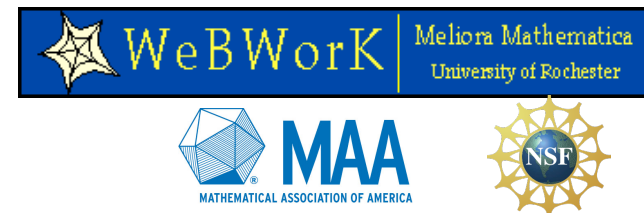
```
<iframe  width="800" height="400"
src="https://demo.webwork.rochester.edu/webwork2/UR102/Demo/5?
    &effectiveUser=jdoe&
    &user=jdoe&
    &passwd=jdoe&
    &templateName=simple&">
</iframe>
```

- Need a course which the student is enrolled in to record grades

- Need restrictions on which problem the student has

- no need for problemSeed — that is supplied by the course

- templateName=simple — removes the navigation links ("system" is the default)

- downside!!!— password is being printed on the html page

- Solution: use sessionStorage   — (file:part2a)

One solution to authentication

```
options["userID"]=sessionStorage.getItem("userID");
options["course_password"]=sessionStorage.getItem("course_password");

<iframe  width="800" height="400"
src="https://demo.webwork.rochester.edu/webwork2/UR102/Demo/5?
    &effectiveUser=options["userID"]&
    &user=options["userID"]&
    &passwd=options["course_password"]&
    &templateName=simple&">
</iframe>
```

- Use "sessionStorage" (a facility like cookies)

  - Not incredibly secure (particularly if you forget to log out) but about the same amount of risk as using cookies.

  - Example embed_WW_summative_problems.html

Code to produce the three summative problems


```
<h1>Summative code snippet</h1>

<li>
<div class="clickme">
      Show/hide: CAPA physics problem 6
</div>
<div class="wwproblem">
      <button  class="webwork-iframe" data-set_id="Demo" data-problem_number="6">
          do problem
      </button>
      <div></div>
</div>
</li>
```

File: embed_WW_summative_problems.html

Code to produce the formative problems

```
<div class="anonymous-ww-problem"
    data-problem_path="Library/Rochester/
setDiffEQ13Systems1stOrder/ur_de_13_15.pg"
    data-problem_seed="234">
</div>

<div class="clickme">
  problem 4
</div>
<div class="anonymous-ww-problem"
    data-problem_path="Library/Michigan/Chap11Sec8/Q05.pg"
    data-problem_seed="234">
</div>

file: embed_WW_formative_problems.html
```

Summary

- Formative

  - url of any "daemon" enabled WeBWorK site

  - **path to problem** on the rendering site

  - **problemSeed**

- Summative

  - WeBWorK course with the student enrolled

  - **Homework set name** and **problem number**

  - localSession storage of username and password

    - other authentication methods are possible