Growing Digital Pedagogy through the Office of Academic Innovation @ University of Michigan

Amy Homkes-Hayes, Lead Innovation Advocate @amynhayes / ahomkes@umich.edu
In the Office of Academic Innovation

➔ We believe learning comes first

➔ We embrace an academic R&D mindset

➔ We recognize that technology and learning analytics have potential to improve the quality of teaching & learning, and expand the reach of our institution

➔ We blend thought partnership with great service

➔ We commit to smart experimentation that produces better and better results

➔ We help U-M blur the lines between scholarship and teaching and learning
Our Vision for the University of Michigan’s Future

- An open model for **pre-college learning** and preparation that broadens access and enhances participation.

- A personalized, rigorous, and inclusive model for **residential learning** grounded in learning analytics and experimentation.

- A flexible and networked model for **global and lifelong learning** that embraces the evolution of a more permeable university.

- A participatory and inclusive model for **public engagement** that accelerates the construction and sharing of new knowledge through public dialogue.
Our Model and our Team

A makerspace, an incubator, a design shop

- **Our model includes several ways for faculty collaboration and engagement including:**
  - Innovators-in-Residence
  - Faculty Champions
  - Fellowships
  - Projects
  - Communities of Practice
  - Consultations
  - Events

- **Our team is made up of:**
  - Learning experience designers
  - Behavioral scientists
  - Research and data scientists
  - Media designers
  - Software developers
  - UX/UI designers
  - Project managers
  - Operations and marketing experts
Examples of our Work

➔ Massive online open courses (MOOCS)

➔ Teach-outs

➔ MicroMasters & Masters Track

➔ Teaching & Learning software*
Academic Data to Help Make Choices
The Vision and History of ART 2.0

2006
A tailored, visual dashboard for academic information is developed for faculty and staff called ART (Academic Reporting Tools).

2015
Digital Innovation Greenhouse develops a student-facing interface, with guidance from the ART 2.0 Steering Committee.

2016
March
ART 2.0 releases CourseProfile as first tool to students at art.dei.umich.edu.
- 5,000 users within first month
- Primary traffic sources: The Michigan Daily, Central Student Government, LSA Student Government, Wolverine Access, LSA Course Guide
PHYSICS 140

General Physics I

PHYSICS 140 is the first of a three-term sequence in general physics consisting of PHYSICS 140, 240 and 340. This sequence is primarily for students in the physical sciences and engineering. PHYSICS 140 offers an introduction to classical mechanics, the physics of motion. Topics include: vectors, linear motion, projectiles, relative velocity, circular motion, Newton's laws, particle dynamics, work and energy, linear momentum, torque, angular momentum, gravitation, planetary motion, fluid statics and dynamics, simple harmonic motion, waves and sound.

Advisory prerequisites:
MATH 115, 120, 185 or 295.

Enforced prerequisites:
Corequisite: PHYSICS 141 (LAB)

Credits:
4.0

Course Evaluations

Learn more about this evaluation data.

- **Desire to take**: 61% of respondents expressed a strong desire to take this course.
- **Understanding**: 90% of respondents thought this course advanced their understanding of the subject matter.
- **Workload**: 56% of respondents perceived the workload for this course as heavier than other courses.
- **Expectations**: 87% of respondents expressed knowing what was expected of them in this course.
- **Increased interest**: 55% of respondents expressed an increased interest in the subject because of this course.

Grade Distribution

The general grade distribution shows the percentage of students receiving each grade, aggregated for the past 5 years.
Eric Wellman
Lecturer IV in Psychology, College of Literature, Science, and the Arts

**Preparedness**
- 91% of respondents thought the instructor seemed well-prepared for class meetings.

**Clarity**
- 66% of respondents thought the instructor explained material clearly.

**Respect**
- 94% of respondents thought the instructor treated students with respect.

3,038 of 7,412 students (41%) responded.

<table>
<thead>
<tr>
<th>Course</th>
<th># Terms taught</th>
<th>Most recently</th>
<th>Preparedness</th>
<th>Clarity</th>
<th>Respect</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 341 (Adv Lab Cog Psych)</td>
<td>11</td>
<td>Fall 2016</td>
<td>98%</td>
<td>94%</td>
<td>99%</td>
</tr>
<tr>
<td>PSYCH 240 (Intro to Cog Psych)</td>
<td>8</td>
<td>Winter 2016</td>
<td>89%</td>
<td>58%</td>
<td>93%</td>
</tr>
<tr>
<td>PSYCH 111 (Intro to Psych)</td>
<td>1</td>
<td>Fall 2016</td>
<td>96%</td>
<td>85%</td>
<td>98%</td>
</tr>
<tr>
<td>PSYCH 121 (Sem in Psy-Nat Sci)</td>
<td>1</td>
<td>Winter 2012</td>
<td>78%</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td>PSYCH 303 (Res Methods in Psych)</td>
<td>1</td>
<td>Fall 2011</td>
<td>94%</td>
<td>69%</td>
<td>95%</td>
</tr>
</tbody>
</table>
Bachelor of Science in Statistics

No. of Graduates 425
The number of students who graduated with this degree each year over the past 10 years. The colors in a bar represent the term the student graduated.

Annual graduates with Bachelor of Science in Statistics

Co-Majors
When people graduate with other majors, these are the most common:

<table>
<thead>
<tr>
<th>Major</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics BS</td>
<td>167</td>
</tr>
<tr>
<td>Economics BS</td>
<td>86</td>
</tr>
<tr>
<td>Psychology BS</td>
<td>11</td>
</tr>
<tr>
<td>Computer Science BS</td>
<td>7</td>
</tr>
</tbody>
</table>

Minors
When people graduate with other minors, these are the most common:

<table>
<thead>
<tr>
<th>Minor</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics BS</td>
<td>25</td>
</tr>
<tr>
<td>Computer Science BS</td>
<td>19</td>
</tr>
<tr>
<td>Economics BS</td>
<td>13</td>
</tr>
<tr>
<td>Asian Lang &amp; Cult BS</td>
<td>4</td>
</tr>
</tbody>
</table>
The Future of ART 2.0

- A way to show grade distributions
- An opportunity to increase dig deeper functionality by role
- A place to explore major pathways and college to career
- A favorable vehicle for the “Transcript of the Future”

Nearly 90% of student users reported they would use the platform again or recommend it to a friend.
ECoach

Personalized Messaging to Students
The Vision for ECoach

Expertise of dozens of instructors, hundreds of students, and behavior change experts

MTS
The Michigan Tailoring System: a mature open-source software system built in the U-M SPH for creating content designed specifically for an individual based on data about that individual

ECoach
Individually personalized messages: getting the right message to the right person at the right time in the right way
The ECoach Interface

Hey, Kathleen.

Kathleen, thanks for answering those questions... now let's make some sense of it all.

First, let's think about the exam
At 60.0%, you're not happy with your score. Maybe you're not used to getting scores that are less than (basically) perfect. But please don't get too discouraged. We'll help you figure out where to go from here.

This first thing to do is figure out what gave you trouble...

WHAT CAN YOU LEARN FOR NEXT TIME?
If you didn't understand certain topics...

- How you can identify your weaknesses earlier next time? That way, you can practice those concepts more before Exam 2. (Problem Roulette's...)

How to improve your grade

To Do  < Week of Oct 17 >  Sort by  

- Gear up for lab
  Complete the One Mean Prelab Assignment before Mon. Oct 31 at 8AM. Video shows how to generate a confidence interval or hypothesis test about a population mean using R. Bring your 250 coursepack or a printed copy of Lab 6 pages on One Population Mean, your iClicker, and the Stats Help Card.

- Lab 7 Groundwork
  Watch the Paired Mean PreLab and complete the Assignment. Use R to assess if there is a difference in the population mean wear for two tire brands.

- Polish off HW 5
  Polish off those required HW 5 questions. Note: Q5 and Q9 require using R/Rcmdr to perform data analyses on fuel efficiencies for 2016 midsize cars and salaries for

Quick Links

- Message Center
- Grade Calculator
- Exam Playbook
- Journal

Message Center

Name That Scenario
Your new best friend

Everyday stats
Cryptography

Exam 1
Your personal plan
An Example of a Pre-Exam One Message

Let's see how you're doing, Taylor.
Ok -- it's almost exam time. We've got some ideas to help you stay on track for the A or A+ you want.

Plan a little catch-up before you study study.
At the start of the term, you weren't so sure if you could get the grade you want. We have good news: there's a reality you can follow. If you follow it, your chances of getting a decent grade are much better than if you skip some steps.

Let's see how things shake out for you in the end:

1. Codelab assignments
Your score so far: 96.5%.
Your Codelab scores are great. Your scores show that you're getting the main concepts and syntax. Hopefully you're also learning from any mistakes you made. Study the corrected answers after you get your score.

2. Zyante readings
Readings missed: 3
Catch up on the Zyante readings, things they'll discuss. Catching up will help you score higher.

3. Lecture attendance
iClicker scores so far: 75.0%.
Review lectures you missed. The best is to review lecture videos (look at the answer), then see

You're doing great on these things.

- **Codelab assignments** — Your score shows that you're getting the main concepts and syntax. Hopefully you're also learning from any mistakes you make by reviewing the corrected answers (the day after the due date).
- **Zyante readings** — You're staying on top of the readings, which is a great habit to have. Each lecture, you're walking in prepared and already somewhat familiar with the things they'll discuss. Consider trying the "challenge questions" to help you put all the concepts together. (These are helpful to prepare for the Free Response portion of the exam.)
- **Lecture attendance** — Your iClicker scores tell us you're showing up and answering the questions correctly. We couldn't ask for anything more.

As an athlete, you know about discipline. You can do this.
The Future of ECoach

● **ECoach is growing!** Currently there are coaches in nine U-M courses, a coach all U-M students may access, and three Coaches at University of California Santa Barbara.

● ECoach is a vehicle for academic research.

● ECoach will likely expand to grades 8/9-12 Outreach.
GradeCraft

Gameful Pedagogy for Learning
The Vision for Gradecraft

Gameful course design

Gameful course design is a pedagogical approach that leverages inspiration from well-designed games to create engaging learning environments. This philosophy relies on Self-Determination Theory to understand what makes different designs motivating. Read more about this at gamefulpedagogy.com!

Elements of gameful courses

- **Earn Up**: Flip the frame so that everyone starts at zero and earns their way up to success as they complete course milestones.
- **Increased Autonomy**: Students make choices about when and what type of work they want to do to demonstrate their learning.
- **Freedom to Fail**: Design learning opportunities for students to take risks and explore without the fear that their grade will suffer.
- **Tangible Progress**: Students can see their progress at any time. Levels, unlocks, and badges provide feedback and support motivation to keep working.

ACADEMIC INNOVATION
UNIVERSITY OF MICHIGAN
The GradeCraft Grade Predictor

Predicted Final Grade: Nintendo DS (B+)

Learning Game Reviews

- Learning Game Review #1: 71,500 / 75,000
- Learning Game Review #2: 38,173 / 75,000
- Learning Game Review #3: 73,666 / 75,000

Learning From Playing A Game

- Game Play Selection Paper: 17,569 / 20,000
- Game Play Design Critique 1: 110,097 / 120,000
- Game Play Design Critique 2: 105,249 / 120,000
- Game Play Reflection Paper: 0 / 160,000

Class Attendance

- Total Earned: 446,500
- Total Predicted: 831,254 (left to earn: 384,754)

Week 2 Readings

- FULL POINTS: 5,000
- DUE: MONDAY, SEPTEMBER 12, 2016

DESCRIPTION


Also explore Gee's 36 learning principles at http://edurate.wikidot.com/the-36-learning-principles (These are taken from Gee, J.P. (2003). What video games have to teach us about learning and literacy. New York: Palgrave Macmillan.)


(Read Chapter 1, “What exactly is a Game?” on Canvas.)


Go to Assignment Details Page
The Future of Gradecraft

- AI’s first commercial software

- Scaling up GradeCraft documentation and gameful pedagogy in parallel (the summer Gameful Institute)

- Three big challenges:
  - Technically supporting mastery-based assessment
  - Knowing how to sufficiently support K-12 contexts
  - Socially fighting the perception that high student success rates = easy
Healthy Minds

- A web-based survey for colleges and universities to assess the mental health landscape and mental health service use / usefulness at their schools

- The only annual mental health survey of college and university students

- Main topics: mental health status, health behaviors, attitudes and awareness, service utilization, environment, and resources offered

- Over 150 colleges and universities are in the Healthy Minds Network

- In 2016/2017, ~45,000 students at 54 different schools participated
The Healthy Minds Interface

- A random sample of students receives email invitations to take HMS in Qualtrics

- These students complete the survey (~15-20 minutes)

- At the end of the survey, students are asked if they would like to receive feedback

- If they click YES, they will be directed to our site where they will get feedback and suggested resources

- If they click NO, they will still be directed to our site and will get suggested resources (they can access their feedback at a later time if they’d like to)

- If they create a login, they can come back and interact with the site. If they don’t create a login, their results dissipate
M-Write

Writing-to-Learn Pedagogies at Scale
The Vision for M-Write

- Support writing in large-enrollment courses
- Create corpora of student writing for text analysis
- Analyze corpora to gauge student learning
- Use automated text analysis to provide actionable information to students and instructors
- Support automated peer review of student writing
# M-Write Peer Review Interface

## Mike Wojan

### Section 208

<table>
<thead>
<tr>
<th>Overview</th>
<th>Peer Review 1</th>
<th>Peer Review 2</th>
<th>Peer Review 3</th>
<th>Peer Review 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Word Count</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/12/17 11:59pm</td>
<td>250 - 500</td>
<td>T-test Analysis, Calc. Mean Difference</td>
</tr>
</tbody>
</table>

### Reviews Given (2/3)

<table>
<thead>
<tr>
<th>To Marie Hooper</th>
<th>Mike did not submit a peer review for Marie</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMAIL MIKE</td>
<td>SEE SUBMISSION</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To Ollie Saunders</th>
<th>Submitted On Time, Graded by Writing Fellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE REVIEW</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To Dave Harlan</th>
<th>Submitted On Time, Graded by Writing Fellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE REVIEW</td>
<td></td>
</tr>
</tbody>
</table>

### Reviews Received (2/2)

<table>
<thead>
<tr>
<th>From Kris Steinhoff</th>
<th>Submitted On Time, Graded by Writing Fellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE REVIEW</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>From Dana Demsky</th>
<th>Submitted On Time, Graded by Writing Fellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE REVIEW</td>
<td></td>
</tr>
</tbody>
</table>
### Student 1

**First criterion goes here**
Thought-provoking NGO strengthening infrastructure, accessibility, disrupt our work engaging inclusive program areas. Inspirational, then overcome injustice, to improve the world unprecedented challenge. Grit, we must stand up storytelling replicable families empower radical segmentation. Green space low-hanging fruit or, progress the resistance to circular the.

**Second criterion goes here**
Outcomes social impact theory of change, strengthening infrastructure scalable technology think tank improve the world white paper. Silo engaging inclusive, support, B-corp energize; replicable, overcome injustice.

**Third criterion goes here**
Thought-provoking NGO strengthening infrastructure accessibility, disrupt our work engaging inclusive program areas. Inspirational, then overcome injustice, to improve the world unprecedented challenge.

### Student 2

#### Please rate the overall usefulness of this review

<table>
<thead>
<tr>
<th></th>
<th>Very useful</th>
<th>Unuseful</th>
<th>Somewhat useful</th>
<th>Useful</th>
<th>Very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Please provide any additional feedback on this review

**Placeholder**

Submit  
Cancel

**First criterion goes here**
Outcomes social impact theory of change, strengthening infrastructure scalable technology think tank improve the world white paper. Silo engaging inclusive, support, B-corp energize; replicable, overcome injustice. Thought provoking NGO strengthening infrastructure accessibility, disrupt our work engaging inclusive program areas. Inspirational, then overcome injustice, to improve the world unprecedented challenge.
### Assigned to me

<table>
<thead>
<tr>
<th>Writing Prompt #3 Name</th>
<th>Due Oct 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission 1</td>
<td>START REVIEW</td>
</tr>
<tr>
<td>Submission 2</td>
<td>START REVIEW</td>
</tr>
<tr>
<td>Submission 3</td>
<td>START REVIEW</td>
</tr>
</tbody>
</table>

### Completed work

<table>
<thead>
<tr>
<th>Writing Prompt #2 Name</th>
<th>Due Sep 24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3</strong> Reviews I received</td>
<td></td>
</tr>
</tbody>
</table>

#### Criterion 1
Organization should be coherent, unified and effective in support of the paper's purpose and consistently demonstrates effective rhetorical transitions between paragraphs.

- **Student 1**: Thought provoking NGO strengthening infrastructure accessibility, disrupt our work engaging inclusive program areas. Inspirational, then overcome injustice, to improve the world unprecedented challenge.
- **Student 2**: Grit, we must stand up storytelling replicable families empower radical segmentation. Green space low-hanging fruit or, progress the resistance to circular the.
- **Student 3**: Outcomes social impact theory of change, strengthening infrastructure scalable technology think tank improve the world white paper. Silo engaging inclusive, support, B-corp energize; replicable, overcome injustice.

#### Criterion 2
Format is correct, meets all assignment directions, and works expertly to support the essay's purpose and plan.

- **Student 1**: Thought provoking NGO strengthening infrastructure accessibility, disrupt our work engaging inclusive program areas. Inspirational, then overcome injustice, to improve the world unprecedented challenge.
- **Student 2**: Grit, we must stand up storytelling replicable families empower radical segmentation. Green space low-hanging fruit or, progress the resistance to circular the.
The Future of M-Write

● Peer review enhancements
  ○ Improvements to how reviews are distributed, more researcher support, others
  ○ Preparations for scaling up to more courses (and several thousand more students)

● Further progress on analytics
  ○ Deeper dive into relevant / predictive features of student writing
  ○ Other ways to support research needs
Online Learning Tools

- Expanding the capabilities of MOOCs, MicroMasters, and/or Teach-outs by developing new tools to enhance learning

- Creating a collection of tools to solve general problems and extend the capabilities of the MOOC platforms like Coursera and edX

- Building tools to improve learning on MOOCs, and to improve the process of authoring and managing MOOCs
An Example of an Online Learning Tool

Visualization Wheel Practice

- Multidimensionality: 4
- Originality: 3.9
- Novelty: 3.9
- Figuration: 3.4
- Decoration: 1.3
- Lightness: 1.9
- Unidimensionality: 1.3
- Familiarity: 0.8
- Redundancy: 0.9
- Abstraction: 2.5
- Functionality: 3.1
- Density: 2.8

Reflect on the process of evaluating this image. Which dimensions did you find hard to rate, and why? Did the rating process help you to understand alternative design options that might not have been explored for a given image?
The Future of Online Learning Tools

- Our first tool, *multimeasure*, is in use in the Michigan MOOC Applied Plotting, Charting & Data Representation in Python on Coursera

- Collecting data from Coursera, edX and other sources to learn more about our MOOC learners

- Investigating how to integrate existing digital edtech tools into MOOCs while concurrently focusing on building new tools for online learners
Problem Roulette

Low risk practice problems for exam prep and topic mastery
The Vision for Problem Roulette

- Web-based practice tool that offers random-within-topic access to a library of past exam-like problems

- Provides students with access to a low-risk practice space to develop domain-specific competencies

- Developed in 2011 for use in eight introductory STEM courses in the College of Literature, Science, and the Arts and the College of Engineering

- Hosts approximately 15,000 study sessions per month during the fall and winter terms with a typical study session lasting 30-60 minutes
Problem Roulette Interface
The Future of Problem Roulette

● Prototyping gameful interfaces for selecting and presenting problems to students

● Enhancing the synergies between Problem Roulette and ECoach to research how different study pathways affect students

● Exploring personalized experiences for current and potential students as well as lifelong learners
Viewpoint

Engaged and Interactive Role-Playing Simulations
The Vision for Viewpoint

- Allow educators to easily create and implement simulation activities in their classrooms
- Provide customized, hands-on role-playing simulations designed to lead to engaged, interactive learning opportunities
- Learners experience strategy development, collaboration, advocacy, and communication
- Designed as a flexible platform that can enable instructors to integrate classroom simulations into a variety of disciplines, topics, and multiple educational levels
The Viewpoint Interface
The Future of Viewpoint

- Making improvements based on the lessons learned from recent simulations in policy and political science courses
- Working with faculty in the law school to expand the flexibility of the tool to encompass new use cases
- Exploring collaboration possibilities with both Ross and the Mass-incarceration MOOC
Wireless Indoor Location Device

- A unique platform for kinesthetic learning
- Enables students to become active participants in complex systems
- Short-term goal: producing an initial set of 35 WILD units to test WILD Walk activities with a class
As AI has expanded so too have our Users

Over 11,000 students in 120 courses have used the GradeCraft LMS

Over 19,000 students have had access to ECoach in 20 courses

Close to 12,000 courses are listed in ART 2.0
We use technology to put data in learners’ hands. This supports decision making, triggers personal connections, motivates action, and guides behavior change.
Want to watch us grow?

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