Connect*ed* in the Classroom

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REGINALD SIMMONS (CRIMINOLOGY)
NED MOORE (ENGINEERING)
Session goals

• Define universal design for learning and provide content-specific examples for each of its three principles

• Describe the characteristics of our students (Gen Z, 1st gen, and beyond) and identify specific strategies to address their learning needs in your classrooms

• Describe a model for identifying, prioritizing, and implementing changes
Universal Design for Learning (UDL)

For a fair selection everybody has to take the same exam: please climb that tree
Understanding UDL: The Architecture Analogy
Exploring Learner variability

What would make you happiest on a Saturday morning?

1. Sleeping Late
2. Exercising / Being Outside
3. Spending time with family/friends
4. Other
What learner variability impacts our students?

Turn & Talk: What barriers to learning exist for our students “at the margins”?

• Generation Z?
• First generation students?
• English as second language students?
• Low-income students?
• Students with disabilities?
Why UDL?
It’s the Law

The Higher Education Opportunity Act (HEOA) of 2008

Defined UDL as a scientifically valid framework for guiding educational practice that:

(A) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and

(B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students.
Why UDL?
It’s research based

- Identified the range and sources of variance in human learning from modern research in the learning sciences.
- Identified important categories addressed in an adequate pedagogy of individual differences.
- Extensive review of research to identify specific practices that are most effective in reducing barriers to instruction.

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**Stage One**

**Stage Two**

**Stage Three**

National Center on UDL
UDL & The Learning Brain
Neuro-variability

UDL recognizes variability in:

**Engagement**: How students will engage?

**Representation**: How students will perceive?

**Action & Expression**: How students will act on their understanding?

### Universal Design for Learning Guidelines

**Provide Multiple Means of Engagement**
- Purposeful, motivated learners
  - Provide options for self-regulation
    + Promote expectations and beliefs that optimize motivation
    + Facilitate personal coping skills and strategies
    + Develop self-assessment and reflection

**Provide Multiple Means of Representation**
- Resourceful, knowledgeable learners
  - Provide options for comprehension
    + Activate or supply background knowledge
    + Highlight patterns, critical features, big ideas, and relationships
    + Guide information processing, visualization, and manipulation
    + Maximize transfer and generalization

**Provide Multiple Means of Action & Expression**
- Strategic, goal-directed learners
  - Provide options for executive functions
    + Guide appropriate goal-setting
    + Support planning and strategy development
    + Enhance capacity for monitoring progress

- Provide options for sustaining effort and persistence
  + Heighten salience of goals and objectives
  + Vary demands and resources to optimize challenge
  + Foster collaboration and community
  + Increase mastery-oriented feedback

- Provide options for language, mathematical expressions, and symbols
  + Clarify vocabulary and symbols
  + Clarify syntax and structure
  + Support decoding of text, mathematical notation, and symbols
  + Promote understanding across languages
  + Illustrate through multiple media

- Provide options for expression and communication
  + Use multiple media for communication
  + Use multiple tools for construction and composition
  + Build fluencies with graduated levels of support for practice and performance

- Provide options for physical action
  + Vary the methods for response and navigation
  + Optimize access to tools and assistive technologies

- Provide options for recruiting interest
  + Optimize individual choice and autonomy
  + Optimize relevance, value, and authenticity
  + Minimize threats and distractions

- Provide options for perception
  + Offer ways of customizing the display of information
  + Offer alternatives for auditory information
  + Offer alternatives for visual information
Provide Multiple Means of Engagement

AFFECTIVE NETWORKS: THE **WHY** OF LEARNING

- Community engagement
- Structure opportunities for peer learning & feedback
- Build in self-reflection, self-assessment, and choice
- +1...Your ideas...

*Purposeful, motivated learners*
Provide Multiple Means of Representation

Activate prior knowledge (K-W-L)

Guided notes & graphic organizers

Access to presentation materials on BbL

Access to course material in various formats (e-books, videos, podcasts)

+1...Your ideas...
Multiple means of action and Expression

STRATEGIC NETWORKS: THE HOW OF LEARNING

- Flexible opportunities for assessment
- Models, exemplary work
- Divide large projects into smaller steps
- +1...Your ideas...
Resources

College STAR  https://www.collegestar.org

College STAR is a grant-funded project that provides online UDL modules and opportunities for networking and research for college faculty.

UDL on Campus  http://udloncampus.cast.org

UDL On Campus is a collection of resources developed by CAST geared towards multiple stakeholders within postsecondary institutions, including instructional designers, faculty, policy makers, and administrators. The purpose of the site is to offer an understanding of Universal Design for Learning (UDL) in higher education and contains four sections: 1) UDL in Higher Education, 2) Course Design, 3) Media and Materials, and 4) Accessibility and Policy. National Center on UDL.

National Center on UDL  http://www.udlcenter.org

The National UDL Center supports the effective implementation of UDL by connecting stakeholders in the field and providing resources and information on UDL implementation and research.

DO-IT  http://www.washington.edu/doit

The DO-IT (Disabilities, Opportunities, Internetworking, and Technology) Center is dedicated to empowering people with disabilities through technology and education. It promotes awareness and accessibility—in both the classroom and the workplace—to maximize the potential of individuals with disabilities and make our communities more vibrant, diverse, and inclusive.
Connecting with our first generation students
Who are first-generation students?

• Students whose parents have not earned a bachelor’s degree

• Nationally, they represent 33% of the college-going population (Cataldi, Bennett & Chen, 2018)

• **Sixty-five percent** of CCSU freshmen in 2016 reported being first-generation students (OIRA, CCSU)
The stakes are high

<table>
<thead>
<tr>
<th>Parent Education</th>
<th>Student attrition three years after starting college</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent(s) earned a bachelor’s degree</td>
<td>14%</td>
</tr>
<tr>
<td>Parent(s) attended some college</td>
<td>26%</td>
</tr>
<tr>
<td>No college education</td>
<td>33%</td>
</tr>
</tbody>
</table>

Beginning Postsecondary Students Longitudinal Study

(Cataldi, Bennett, & Chen, 2018)
What are some of the challenges?

Compared to continuing-generation students, first-generation students:

• Work longer hours at off-campus jobs
• Are more-likely to have family responsibilities
• Are less-likely to be involved on campus
• Have lower perceived academic competence
• Less-likely to ask for help from faculty...why?
What can we do as instructors?

Classroom Practices

• Be enthusiastic, positive, and relevant
• Get their story before making assumptions about students
• Reach-out (in private) to students that are struggling...can make a world of difference
  • Nudging
  • Have knowledge of campus resources that can assist
• During discussions, engage students that appear quiet and/or dis-engaged...why?
  • Reinforce those students for their participation
What can we do as instructors?

Our Assignments

• Have multiple assessments...increases likelihood of student success
• Be strength-based in our feedback
  • Recognize what student did well
  • State what student can do differently for a better grade in the future
• If a student cannot meet during office hours, exercise some flexibility
• Most important of all: A belief that all students can be successful
Connecting the Dots
Where to start?

Provide multiple means of Engagement
- Affective Networks (The "WHY" of Learning)

Provide multiple means of Representation
- Recognition Networks (The "WHAT" of Learning)

Provide multiple means of Action & Expression
- Strategic Networks (The "HOW" of Learning)

Access
- Provide options for Recruiting Interest
- Provide options for Perception
- Provide options for Physical Action

Build
- Provide options for Sustaining Effort & Persistence
- Provide options for Language & Symbols
- Provide options for Expression & Communication

Internalize
- Provide options for Self Regulation
- Provide options for Comprehension
- Provide options for Executive Functions

Expert learners who are...
- Purposeful & Motivated
- Resourceful & Knowledgeable
- Strategic & Goal-Directed

Goal
Provide multiple means of Engagement
- Affective Networks  The “WHY” of Learning

Provide multiple means of Representation
- Recognition Networks  The “WHAT” of Learning

Provide multiple means of Action & Expression
- Strategic Networks  The “HOW” of Learning

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<th>Build</th>
<th>Internalize</th>
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</table>
| Provide options for Recruiting Interest
  • Self directed lab time
  • Factory tours
  • Student competition teams | Provide options for Sustaining Effort & Persistence
  • Redesign of existing part | Provide options for Self Regulation
  • Class wiki
  • Return HW before quiz |

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</table>
| Provide options for Perception
  • Simulations
  • References to everyday items
  • Close caption videos       | Provide options for Language & Symbols
  • Videos of equipment and steps
  • Equation sheet with symbol dictionary | Provide options for Expressions & Communication
  • CAD vs compass and ruler
  • Excel vs calculator vs Python
  • Use process vs simulate |

<p>| | | |</p>
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</table>
| Provide options for Executive Functions
  • Multiple online timed quiz attempts
  • Thorough HW solutions
  • Fast/Detailed feedback via Clavier+ |提供选项 for Executive Functions
  • Multiple online timed quiz attempts
  • Thorough HW solutions
  • Fast/Detailed feedback via Clavier+ | Provide options for Executive Functions
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**Inventory your practices**

**Expert learners** who are...
- **Purposeful & Motivated**
- **Resourceful & Knowledgeable**
- **Strategic & Goal-Directed**
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<tbody>
<tr>
<td>Build</td>
<td><strong>Needs Work</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internalize</td>
<td><strong>Needs Work</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td><strong>Needs Work!</strong></td>
<td></td>
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**Provide multiple means of Engagement**
- Affective Networks: The "WHY" of Learning
- Provide options for Recruiting Interest
  - Self directed lab time
  - Factory tours
  - Student competition teams

**Provide multiple means of Representation**
- Recognition Networks: The "WHAT" of Learning
- Provide options for Perception
  - Simulations
  - References to everyday items
  - Close caption videos
- Provide options for Language & Symbols
  - Videos of equipment and steps
  - Equation sheet with symbol dictionary

**Provide multiple means of Action & Expression**
- Strategic Networks: The "HOW" of Learning
- Provide options for Physical Action
  - Needs Work!
- Provide options for Expression & Communication
  - CAD vs compass and ruler
  - Excel vs calculator vs Python
  - Use process vs simulate
  - Simulation of work
  - Historical context of factories
  - Highlight time of invention
  - Categorize processes in multiple ways
  - CAD vs compass and ruler
  - Excel vs calculator vs Python
  - Use process vs simulate

**Goal**
- Purposeful & Motivated
- Resourceful & Knowledgeable
- Strategic & Goal-Directed
It can be overwhelming

• There are a million things to work on.
• You can’t fix it all at once. Where do you start?
• This is not a new problem.

You need a strategy

• Measure
• Analyze
• Improve
• Maintain
Measure

- Get the data before assigning cause and effect or implementing changes
- Modern tech gives us many ways to get data
  - Performance in follow-on classes
  - Surveys
    - Time spent per HW
    - Time spent on test prep
    - Time spent studying alone vs group
    - In class via apps (micropoll etc.)
  - Online
    - Wiki participation
    - Discussion board participation
    - Tool usage
      - When did they use them?
      - Videos watched?
      - Online quizzes
        - Repeated attempts?
        - How long did they take?
        - HW solution downloads
  - Or go old school
    - Scores on individual test questions
    - HW grades (mean, spread)
    - In class
      - Attendance
      - Participation
      - Where do they sit?
    - Keep a journal
    - Complete UDL table
    - Videotape yourself

Get the data before assigning cause and effect or implementing changes.
Analyze

• Identify patterns and relationships

• Tools
  • Radar plots
  • Fishbone diagrams
  • Scatter plot
  • ANOVA
  • Box and whisker plots
  • Failure Modes and Effects Analysis
  • Cluster Analysis
Time spent in class was worthwhile

Class cancellation was rare

Classes began and ended on time

Lectures were intellectually stimulating

Instruction methods helped me

Major points in class were clear

Instructor available outside of class

Possible to comment/question in class

Assigned reading helped me

My work was graded fairly

# exams & assignments sufficient to eval progress

Exams and HW helped me

Quality of instruction was high

This class made me want to learn more

Overall quality of class was high

My work was graded fairly

# exams & assignments sufficient to eval progress

Exams and HW helped me

Quality of instruction was high

This class made me want to learn more

Overall quality of class was high
Analysis Example – Track former student performance in advanced classes
Analysis Example – FMEA

• List everything that could go wrong for a student
  • Severity: How bad would it be?
  • Probability: How likely is this to happen?
  • Detection: Would you or the student notice the problem?
  • Rank the problem on each measure 1-10. Multiply the three values to get a score.

• Use with student input. Helps raise issues

• Prioritizes problems
## Analysis Example – FMEA

<table>
<thead>
<tr>
<th>Item / Function</th>
<th>Potential Failure Mode(s)</th>
<th>Potential Effect(s) of Failure</th>
<th>Severity</th>
<th>Potential Cause(s)/Mechanism(s) of Failure</th>
<th>Probability</th>
<th>Current Controls</th>
<th>Det</th>
<th>RPN</th>
<th>Recommended Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student required to upload homework to Blackboard</td>
<td>Student can't figure out how to upload work.</td>
<td>Student never turns in homework, fails class.</td>
<td>9</td>
<td>Student cannot find the upload button</td>
<td>3</td>
<td>Missing HW will generate a generic &quot;what's going on&quot; email but nothing that gets at the root.</td>
<td>8</td>
<td>216</td>
<td>Include a screenshot of procedure. Demonstrate in class.</td>
</tr>
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</thead>
<tbody>
<tr>
<td>Register for classes as soon as registration window opens</td>
<td>Miss time - overslept</td>
<td>Required class fills up, delay graduation</td>
<td>9</td>
<td>Registration was at 8AM</td>
<td>6</td>
<td>Entirely students responsibility: alarm clock, phone alarm.</td>
<td>7</td>
<td>378</td>
<td>Multiple alarm clocks. Move earliest registration time back.</td>
</tr>
</tbody>
</table>
Improve

- Examples of Waste Reduction
  - Project complicated sketches onto the board
  - Provide handouts of example problem givens
  - Invert projection palette allows easier sketching on top of images
  - In class projects replace lecture
  - Use Clavier+ feedback automation
  - Write agenda on board
  - Assign free online books
  - Use software that has a free student license
  - Use a Facebook chatbot to answer easy questions

- Create short videos to emphasize key points
- Use the Instructional Design and Technology Resource Center
- Use the Center for Teaching & Faculty Development

- Perfect practice makes perfect
  - Online quizzes with a time limit
  - Allow repeated attempts
  - Provide example tests
  - Provide thorough solutions
Maintain

Track the data over time!
Improving is worthwhile

Short term
Enjoying your job is easier if you’re good at it

Medium term
Competition in heating up
Fewer high school grads

Long Term
I don’t want to be a travel agent
Thank You!

QUESTIONS?

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