new technologies

new possibilities
“gift-wrapping”

"techno-determinism"
Distributed Intelligence

“Wicked problems” require meaningful relationships amongst people with access to different knowledge systems to frame, examine and resolve.
collective comprehensiveness through overlapping patterns of unique narrowness

Campbell as cited in Fischer et al., 2005, P. 10
Intelligence augmentation
(Fischer & Nakakoji 1992)

Support groups for social creativity
(Fischer et al., 2005)

Contextualize generic systems through aiding meta-design, customization, end-user development
(Fischer, 2001)
Disclosure and Stigma

Percentage Receiving Accommodations and Supports

87% Secondary Education

19% Postsecondary Education

Hospitality

Creating free and friendly space for the stranger

Nouwen, 1986
Student success and persistence

(1) high expectations and student’s self-expectations

(2) assessment and feedback with a focus on formative assessment of student progress

(3) academic and social support

(4) engagement in both social and academic processes

(Tinto, 2012)
CAST is an education research and development nonprofit that works to expand learning opportunities for all individuals through Universal Design for Learning (UDL).

We leverage the learning sciences and technology to create products, promote classroom practices, and inform policy.

We design for students at the margins from the outset.

Innovations that are essential to some end up being beneficial to many.
When it comes to learning, natural variability is the rule, not the exception.

Three Learning Networks

**Recognition**
- **what**
- Present information and content in different ways

**Strategic**
- **how**
- Differentiate the ways that students can express what they know

**Affective**
- **why**
- Stimulate interest and motivation for learning
Universal Design compared to accessibility

Arts Building University of Saskatchewan
Daryl Mitchell, February 14, 2014
https://www.flickr.com/photos/daryl_mitchell/

Ramp and Can
Sam Craig, June 18, 2009
https://www.flickr.com/photos/pirateyjoe/
UDL Guidelines

I. Provide Multiple Means of Representation

1: Provide options for perception
   1.1 Offer ways of customizing the display of information
   1.2 Offer alternatives for auditory information
   1.3 Offer alternatives for visual information

2: Provide options for language, mathematical expressions, and symbols
   2.1 Clarify vocabulary and symbols
   2.2 Clarify syntax and structure
   2.3 Support decoding of text, mathematical notation, and symbols
   2.4 Promote understanding across languages
   2.5 Illustrate through multiple media

3: Provide options for comprehension
   3.1 Activate or supply background knowledge
   3.2 Highlight patterns, critical features, big ideas, and relationships
   3.3 Guide information processing, visualization, and manipulation
   3.4 Maximize transfer and generalization

II. Provide Multiple Means of Action and Expression

4: Provide options for physical action
   4.1 Vary the methods for response and navigation
   4.2 Optimize access to tools and assistive technologies

5: Provide options for expression and communication
   5.1 Use multiple media for communication
   5.2 Use multiple tools for construction and composition
   5.3 Build fluencies with graduated levels of support for practice and performance

6: Provide options for executive functions
   6.1 Guide appropriate goal-setting
   6.2 Support planning and strategy development
   6.3 Facilitate managing information and resources
   6.4 Enhance capacity for monitoring progress

III. Provide Multiple Means of Engagement

7: Provide options for recruiting interest
   7.1 Optimize individual choice and autonomy
   7.2 Optimize relevance, value, and authenticity
   7.3 Minimize threats and distractions

8: Provide options for sustaining effort and persistence
   8.1 Heighten salience of goals and objectives
   8.2 Vary demands and resources to optimize challenge
   8.3 Foster collaboration and community
   8.4 Increase mastery-oriented feedback

9: Provide options for self-regulation
   9.1 Promote expectations and beliefs that optimize motivation
   9.2 Facilitate personal coping skills and strategies
   9.3 Develop self-assessment and reflection

Resourceful, knowledgeable learners

Strategic, goal-directed learners

Purposeful, motivated learners

Recognition Networks

the “what” of learning

How we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author's style are recognition tasks.

Provide Multiple Means of Representation

Present information and content in different ways
Three Representation Guidelines

Multiple Means of Representation

Provide Options for Perception

Provide Options for Language, Mathematical Expressions, and Symbols

Provide Options for Comprehension
In 2009 the Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant Program was established as a $2 billion dollar investment to provide institutions of higher education with funds to design and deliver education and career training programs that can be completed in two years or less.

http://www.doleta.gov/taaccct/
The title of this graph is: The Southern Pulp and Paper Mill Expenditures 2010. The graph is a circle with labeled slices of varying sizes. This data shows the percent of the total amount of money that was spent on each of the following: personnel, environmental safety and compliance, operating expenses, marketing and public relations, and miscellaneous.
2. For each fraction, multiply the denominator by a number that will result in the lowest common denominator.

\[
\frac{1}{3} \times 2 = 6
\]

Fraction already has LCD does not get changed

Alternative version

Example sentence:
In the fraction \( \frac{3}{4} \), the numerator is 3 and the denominator is 4.

Clarify vocabulary and symbols
Support decoding text, mathematical notation, and symbols
Promote understanding across languages
STEM Readiness Course Example

Unit 2 - Mathematics

Highlight patterns, critical features, big ideas, and relationships
STEM Readiness Course Example

Unit 2 - Critical Thinking and Workplace Communications

- [Module 1 - Introducing Kelly](http://youtu.be/nFMRaG4p8mM)
- [Module 3 - A Big Storm](http://youtu.be/S0OOLThhU90)

Present introductory story

Present contextualized challenges
Module 11 / The Big Storm

Learn Objective
Apply critical thinking skills to real-life situations and evaluate the outcomes.

The Big Storm
Determining the Problem
The Gathering Storm
Analyze and Plan Amid Growing Complexity
Analyze and Plan Amid Growing Complexity - 2
Assessing and Planning Next Steps
Evaluation
Module Summary and Quiz

Video Scenario
Integrated Instructional Activities
Strategic Networks
the “how” of learning

Provide Multiple Means of **Action and Expression**
Differentiate how learners can act and express what they know

Planning and performing tasks. How we organize and express our ideas. Writing an essay or solving a math problem are strategic tasks.
Three Action and Expression Guidelines

I. Providing Multiple Means of Action and Expression

Provide Options for Physical Action

Provide Options for Expression and Communication

Provide Options for Executive Functions
4,600,000
College students are taking at least one class online

By 2014 that number will increase to 18.65 Million

1/2 of the 4500 brick-and-mortar colleges in the US offer their degree programs online

96% of traditional universities offer at least one class in an online-only format
Personalized Learning

• Students at the Center
If the couple goes out once a week and spends a total of $240 over a month (4 weeks), what calculation can be used to determine how much they spend per week on going out to dinner?

- Multiplication
- Subtraction
- Division
- Addition

Hint: Which of the following is the correct expression for the previous question?

- $240/4$
- $4/240$
- Either of the above expressions would result in the same answer.

Calculate the amount that the couple currently spends going out to eat each week. $\

If the couple decided to cut back on going out to eat to 3 times per month instead of 4, what type of calculation would they use to determine the difference between what they currently spend on going out to eat and the new amount that they would spend going out to eat?

- Addition
- Subtraction
- Division
- Multiplication

Calculate what their new monthly eating out expense would be if they went out one less time per month. $\

Photo courtesy BildSpracheundCo.de, from Flickr Creative Commons.
Additive manufacturing - 3D Printing

“I see a future in this industry, and I can serve my country by learning the technology and software to build 3D-printed exhaust systems for cars and trucks that will save Americans millions in fuel costs someday.”
Class Progress

Designed to help instructors easily view and understand a learner’s progress at-a-glance.

Class Progress Visualization

Customizable display settings
"The always-on nature of the Internet and mobile access devices provides our education system with the opportunity to create learning experiences that are available anytime and anywhere.

When combined with design principles for personalized learning and UDL [Universal Design for Learning], these experiences also can be accessed by learners who have been marginalized in many educational settings: students from low-income communities and minorities, English language learners, students with disabilities, students who are gifted and talented, students from diverse cultures and linguistic backgrounds, and students in rural areas. (p. 23)"
Affective Networks
the “why” of learning

Provide Multiple Means of Engagement

How learners get engaged and stay motivated. How they are challenged, excited, or interested. These are affective dimensions.
## Three Engagement Guidelines

<table>
<thead>
<tr>
<th>Multiple Means of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provide Options for Recruiting Interest</strong></td>
</tr>
<tr>
<td><strong>Provide Options for Sustaining Effort and Persistence</strong></td>
</tr>
<tr>
<td><strong>Provide Options for Self-regulation</strong></td>
</tr>
</tbody>
</table>
Emotion and learning
Prior Learning Assessment

CAEL study of 62,000 adult students at 48 institutions nationwide.

Students with prior learning assessment credit had higher graduation rates, better persistence and lower time to degree, compared to students without PLA credit.

Results were true at institutions of all sizes, controls and levels, and for students of different age, gender, race/ethnicity, and academic ability.
• **Stereotype threat** refers to being at risk of confirming, as self-characteristic, a negative stereotype about one’s group (Steele & Aronson, 1995).
Education, in the deepest sense and at whatever age it takes place, concerns the opening of identities—exploring new ways of being that lie behind our current state. Whereas training aims to create an inbound trajectory targeted at competence in a specific practice, education must strive to open new dimensions for the negotiated self. It places students on an outbound trajectory toward a broad field of possible identities. Education is not merely formative - it is transformative.

Wenger, 1998, p.263
Designed for multiple stakeholders:
• Instructional designers
• Faculty
• Policy makers
• Administrators

Offer understanding of UDL across five categories.
References


Other resources

UDL On Campus [http://udloncampus.cast.org](http://udloncampus.cast.org)

National Center on UDL: [http://www.udlcenter.org](http://www.udlcenter.org)

WebAIM Articles: [http://webaim.org/articles/](http://webaim.org/articles/)

WCAG 2.0: [http://www.w3.org/TR/WCAG20/](http://www.w3.org/TR/WCAG20/)


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