Evidence, Principles, and Theories Applied to Design and Delivery of Online Learning

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Agenda

• Welcome and introductions (5 minutes)
• Background on online learning (20 minutes)
  • Raise your hand if you want to say something
  • In chat, please add challenges, successes, questions
• Large group discussion (30 minutes)
• Concluding thoughts (5 minutes)

• After this session, participants will be able to:
  • Identify challenges in design and delivery of online learning
  • Discuss an approach to developing online curricula
  • Define tactics that are applicable to daily practice in medical education
My background

• General internist
  • Inpatient clinical teaching
  • Independent hospitalist practice
• Faculty development
  • Teach curriculum development at Johns Hopkins
  • Mentor on research and program development
• Education scholarship/research
  • Technologies, well-being, accreditation
• Curriculum development
  • 6 Steps Online
  • Fundamentals of teaching and learning
How I think about learning, teaching, & curriculum

Learning = changes in knowledge, attitudes, or skills that allow someone to do something better

Teaching = facilitating learning

Curriculum = any planned educational experience
How I think about curriculum development: 6 steps

Step 1: Health care problem
- Define desired health care outcome
- Identify opportunities for new online curricula to influence outcome

Step 2: Needs assessment
- Assess learners’ diversity (e.g., language, culture), preferences, time, need for credit
- Determine access capabilities, e.g., device, internet bandwidth and regulations, available technical support

Step 3: Goals & objectives
- Base objectives on needs assessments
- Target highest order objectives that technology permits

Step 4: Strategies (content, methods)
- Choose online format and learning management system
- Choose content considering principles of copyright and fair use and budget
- Design according to multimedia best practices

Step 5: Implementation
- Engage online CD team
- Provide orientation and technological support for online participants
- Address confidentiality, accessibility, revenue, branding, and intellectual property issues

Step 6: Evaluation
- Take advantage of mobile, automated, and repeated assessments and formative assessments
- Evaluate curricular implementation, usability, and user experience
- Identify opportunities to advance the science of learning

Figure 1 Considerations for online curriculum development according to the Six-Step Approach for Curriculum Development for Medical Education.
How does learning happen?

Learning environment (safe, supportive)

+ Rest
Rest and learning: Default Mode Network
Rest and learning: Default Mode Network

- Rumination and obsessive thought
- Spontaneous thought: Dreaming, Mind-wandering, Creative thinking
- Goal-directed thought

Automatic constraints:
- Weak

Deliberate constraints:
- Weak to Strong
## Evidence-based tips

### Table 4. Utility Assessment and Ratings of Generalizability for Each of the Learning Techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Utility</th>
<th>Learners</th>
<th>Materials</th>
<th>Criterion tasks</th>
<th>Issues for implementation</th>
<th>Educational contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elaborative interrogation</td>
<td>Moderate</td>
<td>P-I</td>
<td>P</td>
<td>I</td>
<td>P</td>
<td>I</td>
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<tr>
<td>Self-explanation</td>
<td>Moderate</td>
<td>P-I</td>
<td>P</td>
<td>P-I</td>
<td>Q</td>
<td>I</td>
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<tr>
<td>Summarization</td>
<td>Low</td>
<td>Q</td>
<td>P-I</td>
<td>Q</td>
<td>Q</td>
<td>I</td>
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<tr>
<td>Highlighting</td>
<td>Low</td>
<td>Q</td>
<td>Q</td>
<td>N</td>
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<td>N</td>
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<tr>
<td>The keyword mnemonic</td>
<td>Low</td>
<td>Q</td>
<td>Q</td>
<td>Q-I</td>
<td>Q</td>
<td>Q-I</td>
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<tr>
<td>Imagery use for text learning</td>
<td>Low</td>
<td>Q</td>
<td>Q</td>
<td>Q-I</td>
<td>P</td>
<td>I</td>
</tr>
<tr>
<td>Rereading</td>
<td>Low</td>
<td>I</td>
<td>P</td>
<td>Q-I</td>
<td>P</td>
<td>I</td>
</tr>
<tr>
<td>Practice testing</td>
<td>High</td>
<td>P-I</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Distributed practice</td>
<td>High</td>
<td>P-I</td>
<td>P</td>
<td>P-I</td>
<td>P</td>
<td>P-I</td>
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<tr>
<td>Interleaved practice</td>
<td>Moderate</td>
<td>I</td>
<td>Q</td>
<td>P-I</td>
<td>P</td>
<td>P-I</td>
</tr>
</tbody>
</table>

Note: A positive (P) rating indicates that available evidence demonstrates efficacy of a learning technique with respect to a given variable or issue. A negative (N) rating indicates that a technique is largely ineffective for a given variable. A qualified (Q) rating indicates that the technique yielded positive effects under some conditions (or in some groups) but not others. An insufficient (I) rating indicates that there is insufficient evidence to support a definitive assessment for one or more factors for a given variable or issue.
Evidence-based tips: 6 you can believe in

- **Testing**
  - Works even before you’re taught anything

- **Spaced repetition**
  - Spacing at increasing intervals improves retention
  - Especially good when combined with testing

- **Interleaving**
  - Mixing (not blocking) concepts/topics
  - Hard; can impair short term results but amazing for long term results

- **Elaborative interrogation**
  - Connecting new knowledge with existing/ making it your own
  - Explaining, drawing, etc

- **Concrete examples + abstract concepts**
  - Need both

- **Multimedia principles**
  - Pictures and words can be synergistic
  - Lots of “principles” available for guidance
What’s different about online?

• Good things
  • Potentially accessible by anyone, anywhere, any time
  • Opportunity for more individualization and standardization
  • Virtually unlimited array of multimedia available
  • More options for testing/assessment/retrieval practice

• Limitations
  • Requires devices and online access
  • Educational planning more complex, must accommodate diversity of learners
  • Unfamiliar to many educators and learners
  • Technology-mediated interactions and relationships
What’s different about online?
Zoom Fatigue?
Zoom fatigue: 4 explanations

• Eye gaze at a close distance (think elevator)
  • Increased sizes of faces
  • More time looking directly at people

• Cognitive load
  • More effort sending non-verbal cues
  • More effort interpreting non-verbal cues
  • (Verbal cognitive load, slight delays in timing)

• An all day mirror

• Reduced mobility
Key challenges with asynchronous learning

- Navigation of content/platform
- Relevance for all learners
- Learner:
  - Motivation
  - Time
  - Attention

5 factors to enhance social presence

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>TIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIAL RESPECT</td>
<td>Respond in a timely manner, show appreciation</td>
</tr>
<tr>
<td>SOCIAL SHARING</td>
<td>Share information, express beliefs</td>
</tr>
<tr>
<td>OPEN-MIND</td>
<td>Express agreement &amp; disagreement, expose emotions or opinions</td>
</tr>
<tr>
<td>SOCIAL IDENTITY</td>
<td>Use greetings, address individuals by name</td>
</tr>
<tr>
<td>INTIMACY</td>
<td>Share personal stories</td>
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</tbody>
</table>
Large group discussion

• Challenges
• Successes
• Questions
Online learning: concluding thoughts

• Tremendous potential

• Principles of face to face learning still apply
  • Alignment among needs, learning objectives/outcomes, educational strategies, assessment/evaluation strategies, available resources is more important than using a new model (e.g. flipped classroom) or new method
  • Active learning > passive learning
    • Desirable difficulties -> testing, retrieval practice
    • Interaction/discussion > watching videos
  • Need a safe, supportive learning environment
    • Learner motivation and freedom to fail are critical
    • Relationships are important

• Understanding how technology helps or harms can help you make best use
References


• Slides 7-8:


• Slide 14: Bailenson JN. Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. Technology, Mind, and Behavior. 2021 Feb 23;2(1).