Best Practices in Medical Education Curriculum Design

Game Plan

- Discuss the limits of on-line cognitive processing (thinking and making sense of information in real-time)
- Apply this information to revise and refine your AMEP learning objectives
- Compare and contrast learning and evaluation frameworks and their relationship to medical education curriculum design
- 5 min on AuxEd

Medical Education

- Learners at all stages (UME, GME, CME) are constantly drinking from a firehose, expected to learn, retain, and apply large amounts of complex information

- Although the learning goals in medical education are often ambitious, the fundamental limits of the human brain still apply

Demonstration

- I’m going to ask you to study a list of words for 25 seconds

- Then, I will hide the list and ask you to recall as many of the words from the list as possible

apple	train	guitar	ocean	chair
balloon	river	pencil	mountain	coffee
door	sunset	blanket	street	book
flower	mirror	school	window	forest
baby	shoe	candy	tissue	hallway

Write down as many words as you can recall

apple	train	guitar	ocean	chair
balloon	river	pencil	mountain	coffee
door	sunset	blanket	street	book
flower	mirror	school	window	forest
baby	shoe	candy	tissue	hallway

Results

How many words did you recall?

Working Memory

- Initial research into working memory showed that humans can typically recall 7 times (+ or – 2)

- Later research showed that working memory capacity could be thought of as "chunks" of information

Miller, G. A. (1956). *The magical number seven, plus or minus two: Some limits on our capacity for processing information.* **Psychological Review, 63**(2), 81–97. https://doi.org/10.1037/h0043158

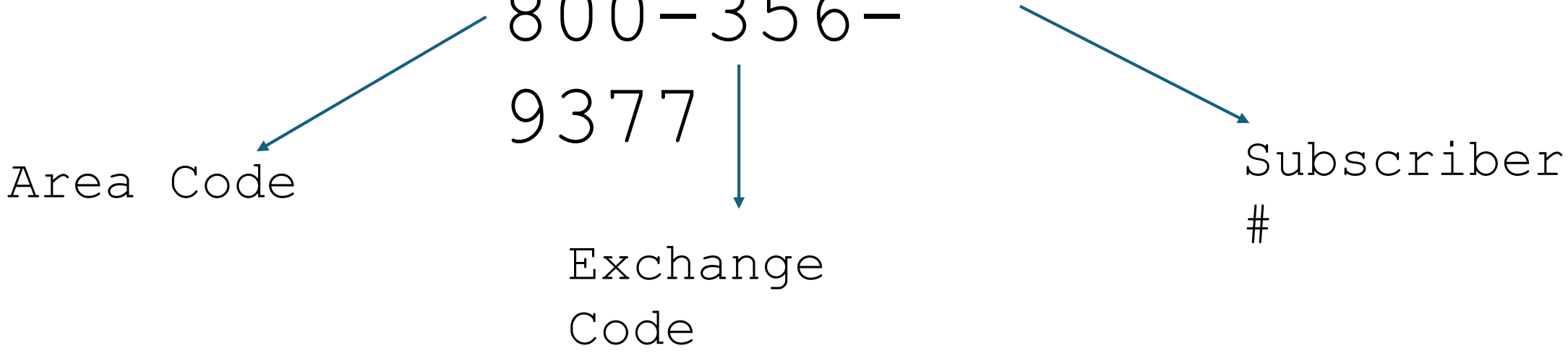
Cowan, N. (2001). *The magical number 4 in short-term memory: A reconsideration of mental storage capacity.* **Behavioral and Brain**

Working Memory

If I asked you to remember a phone number, you likely wouldn't memorize the string of 9 individual numbers, you'd chunk them

800356937
7

800-356-
9377



WM and LTM

- The amount of information and how it's delivered is critical in determining what information makes it into working memory

- For information to be stored in long-term memory, simply presenting learners with it will almost always be insufficient

apple	train	guitar	ocean	chair
balloon	river	pencil	mountain	coffee
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baby	shoe	candy	tissue	hallway

LTM

- Factors that affect whether information is stored in long-term memory include
  - Focused attention of learners
  - Encoding strategies (chunking, other mnemonic devices)
  - Rehearsal
  - Retrieval
  - Other contextual factors (emotional state, location)

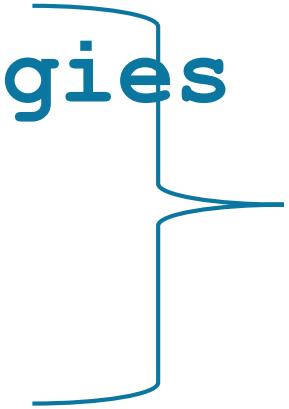
LTM

- Factors that affect whether information is stored in long-term memory include
  - ~~Focused attention of learners~~

  - ~~Other contextual factors (emotional state, location)~~

LTM

- Factors that affect whether information is stored in long-term memory include
  - ~~Focused attention of learners~~
  - **Encoding strategies**
  - **Rehearsal**
  - **Retrieval**
  - ~~Other contextual factors (emotional state, location)~~



These are things you have some control over

Encoding Strategies

- Encoding strategies help learners organize, connect, and make sense of new information so that it can be successfully stored in long-term memory.

- Examples:
  - Using patient stories to help learners connect the theory to real-life behaviors
  - Grouping withdrawal symptoms into physical vs. psychological categories

Rehearsal

- Actively practicing or repeating information to keep it active in working memory and strengthen it for long-term storage

- Examples:
  - Role-playing motivational interviewing with peers after learning the core principles
  - Reciting aloud the diagnostic criteria for substance use disorder

Retrieval

- Actively pulling information out of memory, which strengthens long-term retention and improves future recall

- Examples:
  - Practice tests and quizzes
  - Doing a “brain dump" at the end of a session, where learners quickly write down everything they can remember about the topic

Demonstration: Part 2

- I’m going to ask you to study a list of words for 25 seconds

- Then, I will hide the list and ask you to recall as many of the words from the list as possible

manifold	semiotic	allegory	stochastic	topography
orthogonal	arbitrage	heuristic	linear	hegemony
affidavit	bosun	variance	subpoena	torsion
wythe	ballast	receptacle	torque	positivist
ontology	mimesis	fiduciary	belay	emulsify

Write down as many words as you can recall

manifold	semiotic	allegory	stochastic	topography
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Results

How many words did you recall?

The greater the volume of information the brain must process and interpret, the higher the likelihood that information will be overlooked.

How can we reconcile the overwhelming demands of medical education with the cognitive limits of human learners?

Solution

- Being intentional and creating learning objectives that are **measurable** (observable) and **right-sized** for your learners

Learning Objectives

- Measurable learning objectives provide clear targets, helping both educators and learners identify what successful learning looks like

- They also support effective evaluation, allowing educators to determine whether learning has occurred and where additional support may be needed.

- **How can you ensure that your learning objective are measurable?**

Learning Objectives

- Align your learning objectives with an established evaluation framework:
  - Bloom's Taxonomy
  - Moore's 7-Level Framework
  - Kirkpatrick's Levels of Evaluation

Right-sizing your learning objectives is informed by:

- Needs assessment data (surveys, interviews with learners)
- Direct learner feedback
- Discussions with colleagues and content experts
- Review of the literature
- Curriculum mapping (to see what learners have already covered and what they will encounter later)
- Learner performance data (exam scores, OSCEs)
- Accreditation standards or competencies (e.g., ACGME milestones)

Over the next 5 minutes…

1. There are handouts that briefly cover each of these evaluation frameworks. Take a few minutes to review them and select one to align your learning objectives with.

2. Then, review your drafted learning objectives alongside the evaluation framework you selected (editing if you have time, but not required)

Learning Objective Review

- Small group share and feedback (15-20 minutes)
  - Read your learning objectives aloud to your group (<1 min)
  - Group members provide feedback on learning objectives (2-3 min)
  - About 3-4 minutes per person maximum

Instructional Approach

- Now that you have revised your learning objectives it's time to consider the instructional approach you will use to achieve those objectives.

- It may seem counterintuitive to begin with an evaluation framework as a first step and then consider your learning framework second. However, establishing clear, measurable learning objective ensures that you know exactly what success looks like in learners.

- Once those objectives are defined, the learning framework helps determine how that learning is

	Learning Frameworks	Evaluation Frameworks
Purpose	Explain *how* people learn	Ensure learning objectives are *measurable and assessable*
Focus	Theories and models of cognitive, emotional, and behavioral learning processes	Structures for evaluating whether learning has occurred
Supported by	Learning science and education research	Assessment science and evaluation theory

Identifying the best route to get there

Choosing your destination

You can't book a flight until you know where you want to go

Learning Frameworks

- Andragogy (adult education theory)
- Cognitive load theory
- Kolb's Experiential Learning Cycle

- Evidence-based learning frameworks are not mutually exclusive and rarely are at odds with each other → just like with patient care, the more evidence-based practice you bring to teaching, the more effective you will be

- Zackoff et al. (2019) presents several learning frameworks in addition to these three

Note on “Theory”

- In science, published theories refer to rigorous, evidence-based explanations of real-world phenomena – we still use the word “theory” to describe them because you can never be 100% certain of any conclusion that is derived from statistics
- This is very different from the casual way someone might use the word "theory" in conversation

- **A formal theory is built through research, tested across contexts, and used to reliably predict and guide outcomes.**

Importance of Frameworks

- Aligning your AMEP with existing evaluation and learning frameworks demonstrates intentionality in your educational design, helps to ensure coherence between your learning objectives and outcomes, and enhances the rigor of your evaluation

- Also, this alignment makes it easier to write up your research and publish because you have a record of why you did what you did and the rationale behind it

Applying Learning Frameworks

- **Learning objective:** Initiate buprenorphine treatment for a new patient with opioid use disorder

- Group 1: Andragogy
- Group 2: Cognitive Load Theory
- Group 3: Kolb's Experiential Learning Cycle

- Design a learner engagement activity to help achieve the objective. Be sure to note:
  - What the activity is and how it supports the

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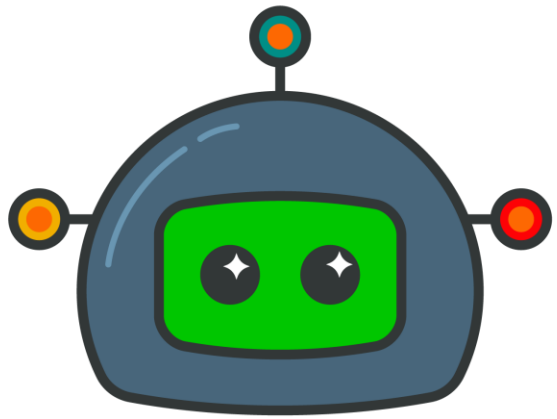
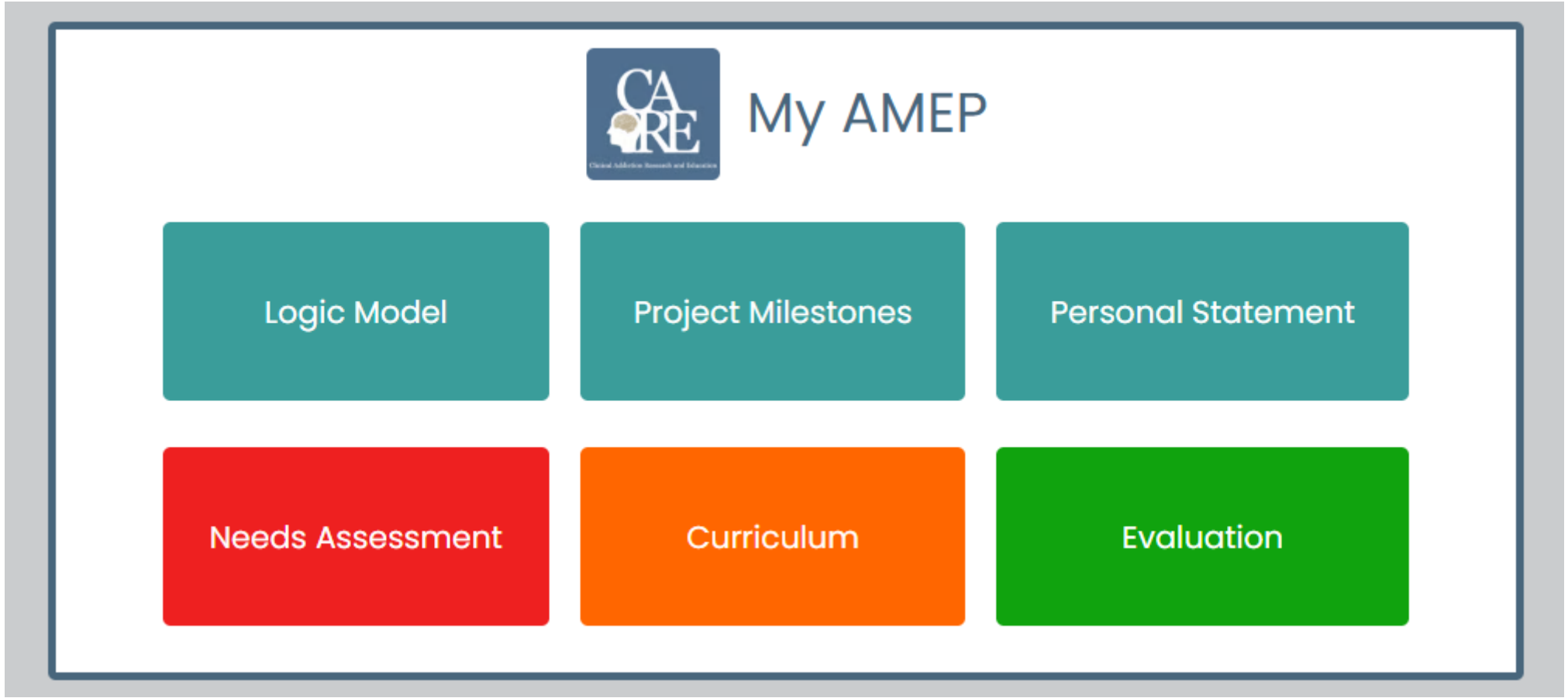


Project Dashboard



Standalone Tools

For a quick-start option, use the standalone tools to focus on specific elements of your session

Write Learning Objectives
Ensure your objectives are measurable and aligned with an evaluation framework

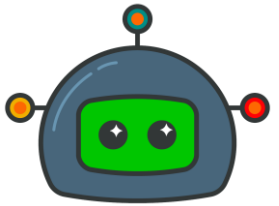
Develop Learner Engagement Strategies
Generates engaging activities to enhance learner participation

Design a Measurement Tool
Includes assessments, evaluation surveys, interview guides and focus groups

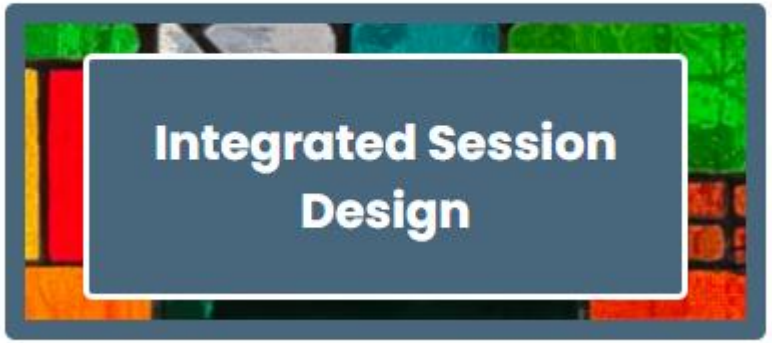
Scan Content for Accessibility
Identifies areas where content may be inaccessible to learners

Scan Content for Inclusivity
Identifies areas of possible bias or stigma in content

AuxEd can do all the things we just did (plus a lot more)

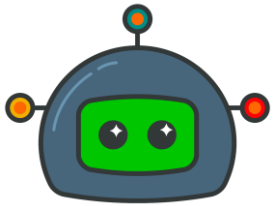


Design a cohesive Session through a guided, step-by-step process



View or revise your existing Sessions

Intellectual Property



Assistant Mode

A non-generative option that organizes, structures, and refines your input without adding intellectual content.

Partner Mode

A generative option that actively engages, provides intellectual contributions, and helps develop new ideas.

Assistant Mode helps with organizational tasks like rephrasing for clarity, ensuring alignment with selected frameworks, and flagging potential bias. It saves users time and improves quality without generating original intellectual property.

Partner Mode acts as a creative collaborator, helping users develop ideas, generate new content, and refine their work. It supports intellectual partnership and co-creation, with outputs considered AI-supported intellectual property.

Users are responsible for ensuring compliance with their institution's or publisher's guidelines regarding the use of AI in research!