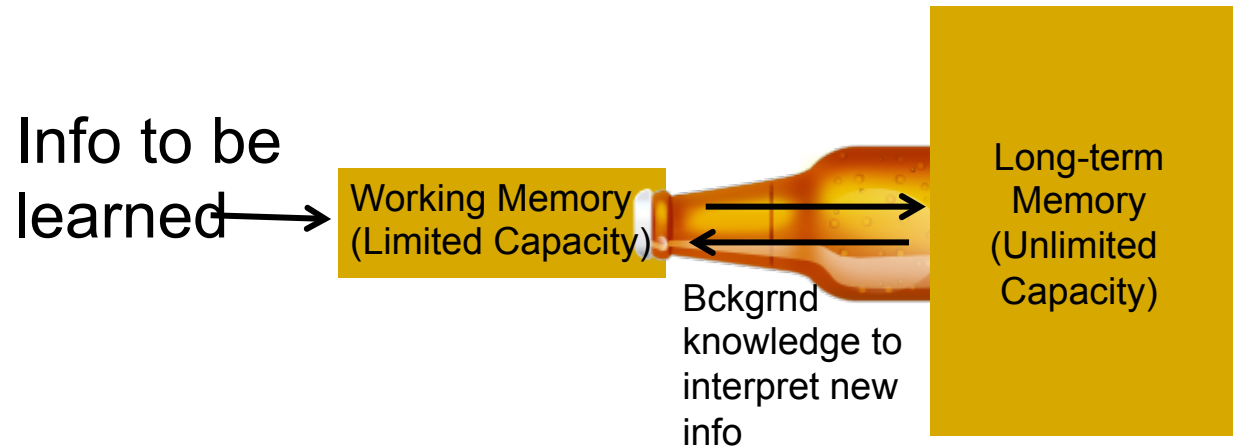


# Mechanics of human memory



- Understanding (vs rote memorization) requires *doing stuff* with knowledge
  - not just listening and recording.
  - *More* doing = *More* understanding
- Rudiments practiced = routine not conscious,
  - reduces cognitive load to learn new, higher level content

<https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/>

<http://brainconnection.positscience.com/topics/?main=fa/working-memory4>

[http://www.screencast.com/users/Teach-Learn\\_0/folders/Jing/media/cf63a16a-57f6-4963-9928-55a290ccb2bb](http://www.screencast.com/users/Teach-Learn_0/folders/Jing/media/cf63a16a-57f6-4963-9928-55a290ccb2bb)

[http://www.screencast.com/users/Teach-Learn\\_0/folders/Jing/media/20d6b535-225e-4a0d-86c5-7def169cf6af](http://www.screencast.com/users/Teach-Learn_0/folders/Jing/media/20d6b535-225e-4a0d-86c5-7def169cf6af)

[http://en.wikipedia.org/wiki/Working\\_memory](http://en.wikipedia.org/wiki/Working_memory)

- Peer-collaboration in active learning classroom spaces
- Frequent, immediate, individualized feedback and “unlimited” practice
  - IT-delivered and graded (feedback) homeworks and assessments
  - Instructors = coaches-in-midst rather than sages-on-stage
- Personalized learning and instruction
  - Self-pacing
  - Students get their individual questions answered, not “one-size-fits-all”
  - Personalized and detailed data tracking of student engagement & “sticking” points

[1] Scott, G., Coates, H., & Anderson, M. (2008). “Learning leaders in times of change...” University of Western Sydney and Australian Council for Educational Research. Retrieved October 18, 2010 from [http://www.acer.edu.au/documents/UWSACER\\_CarrickLeadershipReport.pdf](http://www.acer.edu.au/documents/UWSACER_CarrickLeadershipReport.pdf)

[2] Cabrera, A. F. & La Nasa, S. (2005). Classroom teaching practice: Ten lessons learned. In W. de Vries (Ed.). *Calidad, eficiencia y evaluación de la educación superior* (129-151). Spain, Madrid: Netbiblo; Seymour, E. & Hewitt, N.M. (2000). *Talking about Leaving: Why undergraduates leave the sciences, 2<sup>nd</sup> Ed.* Co: Westview Press; Treisman, P.U. & Surlis, S.A. (2001). Systemic reform and minority student high achievement. In *The right thing to do, the smart thing to do: Enhancing diversity in the health professions in honor of Herbert W. Nickens, M.D.* (pp. 260-280). Washington, DC: Institute of Medicine, National Academy Press, National Academy of Sciences.

[3] <http://www.educause.edu/LearningSpaces> ; <http://www.thencat.org>

# Wisconsin Collaboratory for Enhanced Learning

([www.wiscel.wisc.edu](http://www.wiscel.wisc.edu))

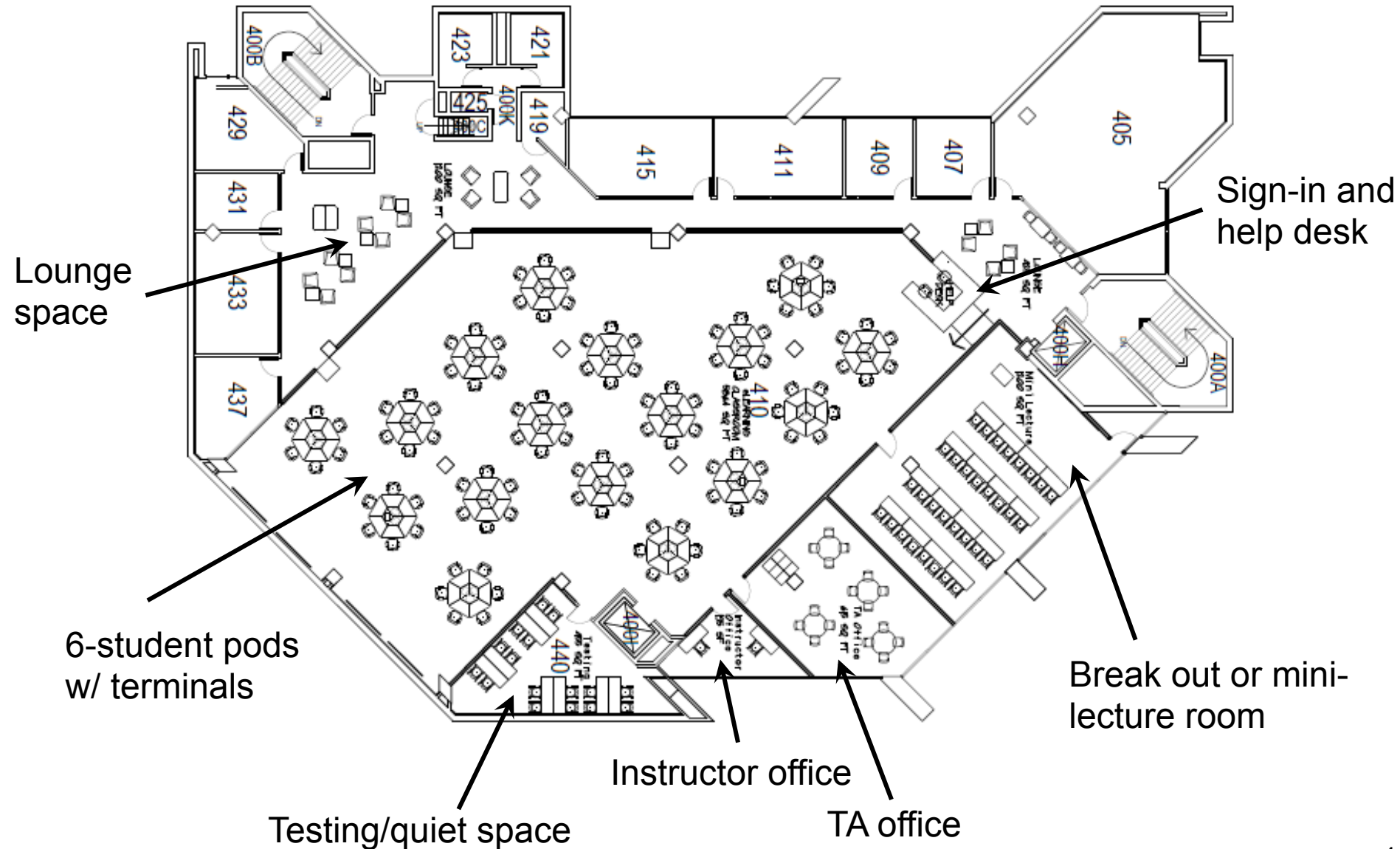


**WisCEL**

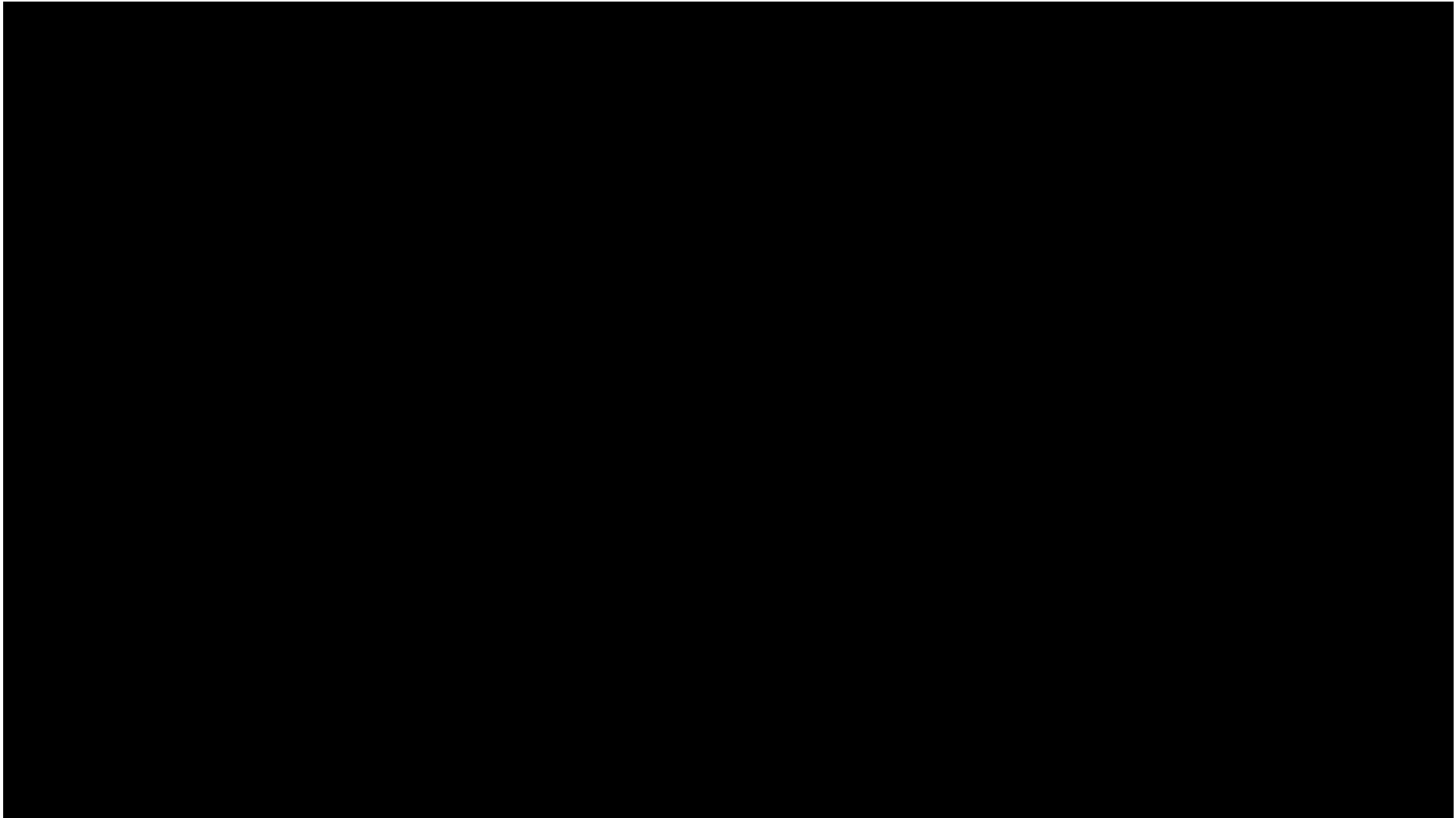
UNIVERSITY OF WISCONSIN-MADISON

*Combining pedagogies, learning space design and instructional technology deployment to personalize and humanize learning, improve learning outcomes and prepare students for the 21<sup>st</sup> century knowledge economy*

# WisCEL learning spaces: formal emporium + informal commons



# Illustrative WisCEL class

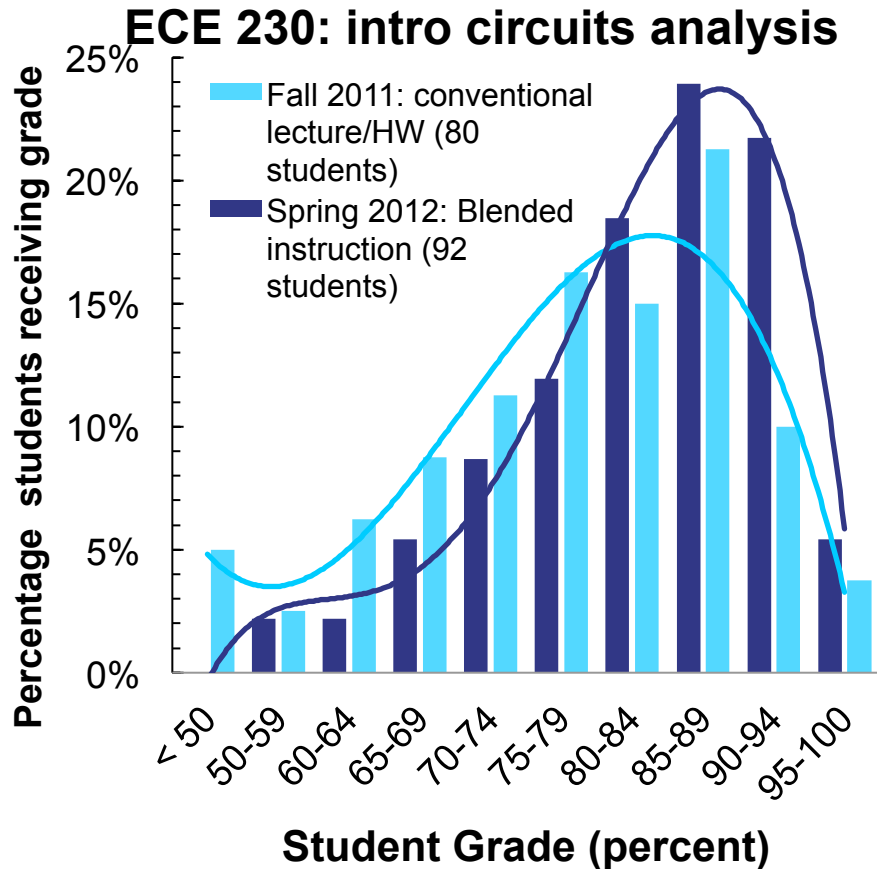


# Features of the experience

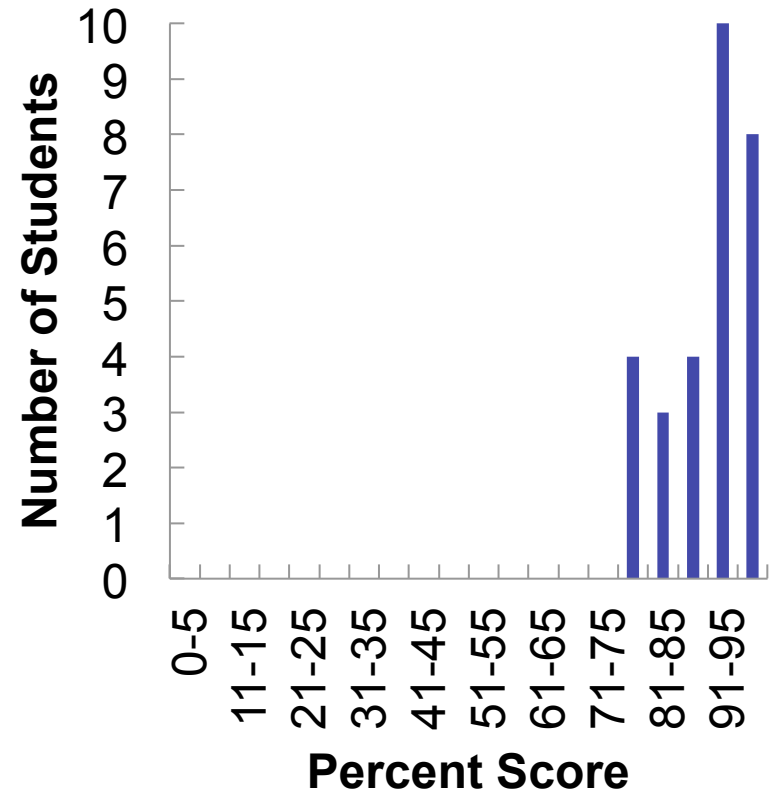


- Substantial up front cost, reduced operating costs/time
- Students fully engaged *100% of the class time* with learning
  - More time-on-task, frequent immediate feedback, *Prefer 75 min over 50 mins!*
- Talking to peers spontaneously, getting unstuck
- Agilely interacting with different peers depending on who can best answer the question (instructor/TA last resort, not first)
- Instructor experience: *FUN!*
  - Finding out what students stuck on
  - Success for all (most)
  - Interactions richer, deeper
  - No office hours needed!
  - No lecture prep!
  - No homework set design, no HW grading
- Administration appreciates it
  - Addressing “performance gap”, decreasing failures, increasing competency outcomes
  - Space used 24/7
  - Coach-in-midst model gives effective learning w/ efficient novice:expert ratio of 25-30:1
    - ♦ Experts: instructors, TAs (grad students), or advanced undergrad peer coaches

# ECE 230: intro circuits analysis



### ECE 219: "vector calc for EM & Sol State"



- Few/No D's & F's
- More A's and B's

- ~ 600 students per semester (freshmen)
- Compare 2006-2011 to 2012 (WisCEL instruction)
  - Targeted versus non-targeted group performance
    - Prior to Fall 2012
      - ♦ Non-targeted group:  $60\% \geq B$  and  $10\% \leq D$  (incl drop)
      - ♦ Targeted group:  $40\% \geq B$  and  $25\% \leq D$
      - ♦ 15-20% gap!
    - Fall 2012
      - ♦ No difference ... *no gap!*
      - ♦ Both groups now:  $60\% \geq B$  and  $10\% \leq D$



# Cross-disciplinary



- Libraries: College (3<sup>rd</sup> floor, east) and Wendt (4<sup>th</sup> floor)
- Fall-Spring 2012-13
  - 77 sections (24 distinct courses)
  - 61 instructors
  - 3 Colleges (L&S, Engr, Bus)
  - > 2700 enrolled students