

**Education  
Grand Rounds**  
University of Oklahoma Health Sciences Center

Teaching Excellency in Competency-Based Education  
David L. Gordon, M.D., FAAN, FAHA  
Professor & Chair, Department of Neurology  
University of Oklahoma Health Sciences Center

*Please turn your cell phones and pagers to silent or off.  
Thank you!*

**TEACHING EXCELLENCE IN  
COMPETENCY-BASED  
EDUCATION**  
*for Medical Students*

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## DISCLOSURES

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### ■ FINANCIAL DISCLOSURE

- DLG has nothing to disclose

### ■ UNLABELED/UNAPPROVED USES DISCLOSURE

- DLG has nothing to disclose

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## LEARNING OBJECTIVES

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- Describe a competency-based, objectives-driven clinical curriculum and how it differs from a traditional clinical curriculum
- List and describe the 10 essential features (ABCs) of competency-based education
- Name three key factors in creating an optimal clinical-learning environment within a competency-based curriculum

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## TEACHING IS AN ART, EDUCATION IS A SYSTEM

### Definitions per Merriam-Webster Dictionary

- Teaching = the act, practice, or profession of a teacher (#1)
- Education = the field of study that deals mainly with methods of teaching and learning in schools (#2)

### Essential Qualities per DLG

- Teaching excellence
  - Ability to convey enthusiasm & make material accessible
- Education excellence
  - Ability to develop and implement consistently effective systems of teaching and learning

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## WHAT IS THE CORRECT ANSWER?

Experts are the best instructors.

- A. True
- B. False

*“Evidence from cognitive science, organizational behavior, and educational psychology suggests that experts are not always the best teachers.”*

*Huston T. Teaching What You Don't Know (2009)*

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## WHAT IS THE CORRECT ANSWER?

Superior performance correlates best with:

- A. Deliberate practice
- B. Domain-related knowledge
- C. Extensive experience
- D. General education

*“Superior performance does not automatically develop from extensive experience, general education, and domain-related knowledge.”*

*“Observed performance does not necessarily correlate with greater professional experience.”*

*“Expert performance can, however, be traced to active engagement in deliberate practice.”*

Ericsson KA. Acad Emerg Med 2008;15:988-994

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## WHAT IS THE CORRECT ANSWER?

Professional expertise correlates best with:

- A. Deliberate practice
- B. Perceived mastery of knowledge and skill
- C. Reputation

*“Traditionally, professional expertise has been judged by length of experience, reputation, & perceived mastery of knowledge & skill.”*

*“Unfortunately, recent research demonstrates only a weak relationship between these indicators of expertise & actual, observed performance.”*

*“Expert performance can, however, be traced to active engagement in deliberate practice.”*

Ericsson KA. Acad Emerg Med 2008;15:988-994

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## WHAT IS THE CORRECT ANSWER?

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You should teach to the test.

- A. True
- B. False

*“When educational evaluation data are seen and used as a tool, not a weapon, the outlook becomes improvement and mastery rather than enforcement.”*

McGaghie WC. Guidebook for Clerkship Directors (2005)

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## WHAT IS THE CORRECT ANSWER?

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External standardized tests such as the USMLE are valid measures of clinical performance.

- A. True
- B. False

*“USMLE Step 1 & 2 scores do not correlate with reliable measures of clinical skill acquisition by medical students, residents, & fellows.”*

*“The validity argument about using USMLE Step 1 & 2 scores for postgraduate residency selection decisions is not structured, coherent, or evidence based.”*

*“Continued use of USMLE Step 1 & 2 scores for postgraduate medical residency selection is discouraged.”*

McGaghie WC et al. *Acad Med* 2011;86:48-52

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## TRADITIONAL CURRICULUM IS TEACHER & PATIENT CENTERED

- Ward teaching
  - Difficult to standardize (variable patients & faculty)
  - Inefficient time (limited teaching, feedback, deliberate practice)
  - Not highest priority (secondary to patient care & safety)
  - Increasingly inadequate for training due to time constraints induced by changes in healthcare delivery & duty-hour limitations
- Didactic teaching
  - Lecture format (passive with limited long-term retention)
  - Based on faculty expertise (not student need)
- Assessments
  - Ward assessment—high validity, but low reliability, inconsistent implementation, & often inconsistent with declared curriculum
  - Independent MCQ exam (e.g., “shelf”)—not linked to objectives or student experiences & does not assess skills, attitudes, behavior

**Local expertise drives learning  
& assessments do not reflect or drive performance**

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## COMPETENCY-BASED CURRICULUM IS LEARNER CENTERED

- Emphasizes learner needs, not teacher needs or knowledge
- Objectives are not superfluous—they drive the process (“Begin with the end in mind” – Steven Covey)
- Standardized learning and assessment for all learners, regardless of ward experiences
- Assesses what is learned, not what is taught
- Requires major changes in:
  - Traditionally-held tenets of education (buy-in of key faculty)
  - Learner and institution schedules (buy-in of chair & deans)
- Preferred by vast majority of learners
  - Most like structure & direction—everyone learns

**Consensus guidelines & course objectives drive learning  
& assessments reflect & drive performance**

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## COMPETENCY-BASED EDUCATION: THE PROCESS GUARANTEES SUCCESS

### Models for Curriculum Development

#### Traditional / Flexnerian “Planning Forwards”

1. Define “fundamental knowledge”
2. Teach fundamentals
3. Test knowledge
4. Hope for best

#### Competency / Outcome-Based “Planning Backwards”

3. Develop learning experiences
2. Design measures and standards of performance
1. Define successful graduate

Stephen R. Smith, M.D., MPH  
*A Practical Guide for Medical Teachers, 3<sup>rd</sup> ed. (2009)*

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## THE LOGIC BEHIND COMPETENCY-BASED EDUCATION

1. Competent physicians demonstrate certain knowledge, skills, attitudes, & behaviors (KSAB)
2. Graduating students & residents must demonstrate core KSAB
3. Assessment of core KSAB requires setting specific, measurable standards (= objectives or competencies), i.e., establishment of a competency-based curriculum
4. Learning core KSAB requires deliberate practice with feedback in a standardized curriculum
5. Demonstration of competence is an all-or-none phenomenon
6. Assessment of competence requires mastery testing with criterion-referenced grading

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## COMPETENCY-BASED EDUCATION: 10 ESSENTIAL FEATURES (THE ABCs)

- Alignment of curriculum
- Blended learning environment
- Consistency—extramural & intramural
- Core competencies
- Deliberate practice for skills training
- Experiential parallel to standardized learning
- Formative & summative assessments
- Grading criterion referenced (mastery testing)
- Homogeneity (standardization)
- Institutional support

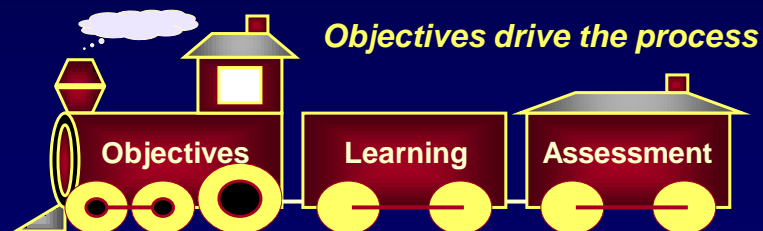
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## A ALIGNMENT OF CURRICULUM

- Step 1: Create practical, meaningful, clearly-stated, and measurable objectives (learning outcomes)
- Step 2: Devise standardized learning experience consistent w/ objectives
- Step 3: Make assessments (evaluations) consistent w/ objectives and learning




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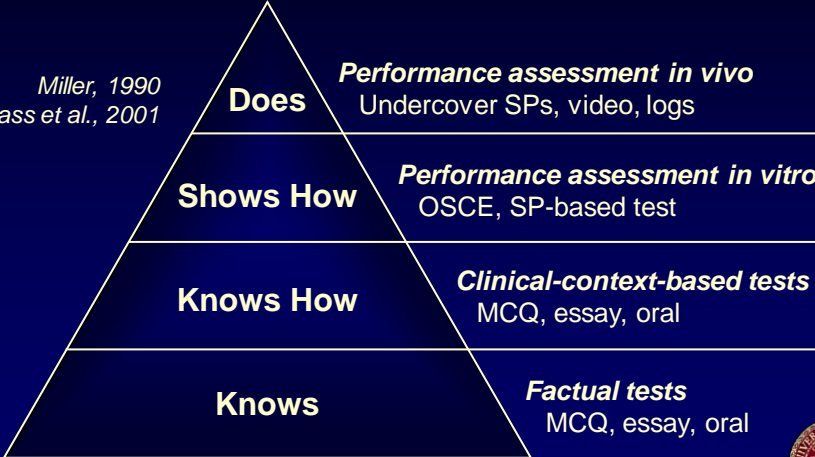
**B BLENDED LEARNING ENVIRONMENT**  
 Match learning & assessment strategies to objective type

Objective Type	Directive	Learning Strategies	Assessment Strategies
<b>Cognitive</b>	Teach and test <u>core</u> material	- Classroom - Small group - Readings - Multimedia/web	Summative - Written tests (MCQ, matching, fill in blank) - Oral exam
<b>Skills</b>	Provide feedback, deliberate practice re: <u>core</u> material	- Patients - SP / OSCE - Multimedia/web	Formative & Summative - Same as learning strategies
<b>Attitudes &amp; Behaviors</b>	Integrate in curriculum & role model—openly combat ethical erosion of hidden curriculum	- Patients - SP / OSCE - Reading / essay - Small group - Discussion - Gaming	Formative - Same as learning strategies

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**B BLENDED LEARNING ENVIRONMENT**  
 Match learning & assessment strategies to competence type

**Miller's Pyramid of Competence**



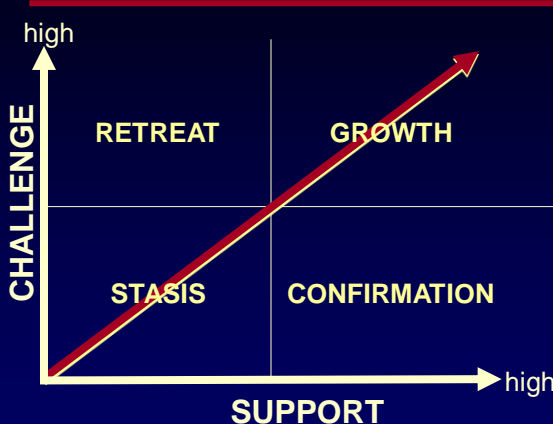
Miller, 1990  
 Wass et al., 2001

<b>Does</b>	<b>Performance assessment in vivo</b> Undercover SPs, video, logs
<b>Shows How</b>	<b>Performance assessment in vitro</b> OSCE, SP-based test
<b>Knows How</b>	<b>Clinical-context-based tests</b> MCQ, essay, oral
<b>Knows</b>	<b>Factual tests</b> MCQ, essay, oral

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## **B** BLENDED LEARNING ENVIRONMENT

*The support-challenge model of learning (Bower, 1998)*



**SUPPORT**


- Core competencies / Pre-identified objectives
- Curricular alignment
- Private formative assessment (1-on-1 feedback)

**CHALLENGE**

- Public formative assessment (feedback before or by peers)
- Summative assessment

*“Rule with an iron fist & a heart of gold”*


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## **C<sub>1</sub>** CONSISTENCY

- Extramural consistency
  - Base course on consensus statement
  - Obtain external review
- Intramural consistency
  - Longitudinal
    - M1 through M4
    - KSAB (knowledge, skills, attitudes, behaviors)
  - Horizontal
    - Intracurriculum / Intradepartment / Interdepartment
    - Hidden / informal curriculum
    - Across multiple clinical sites
  - Requires extensive communication and cooperation among course directors and faculty—and is most effective with institutional direction and oversight

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## **C<sub>2</sub> CORE COMPETENCIES** ***Required Characteristics***

- Pertinent (learner-population specific)
- Integrated (defined first & as guide for rest of curriculum)
- Comprehensive (KSAB, all 6 ACGME competencies★)
- Consistent (extramurally & intramurally)
- Standardized (uniformly taught in curriculum)
- Assessable (varied methods, matched to objective type)

- ★ (1) Patient care
- (2) Medical knowledge
- (3) Practice-based learning & improvement
- (4) Interpersonal & communication skills
- (5) Professionalism
- (6) Systems-based practice

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## **C<sub>2</sub> CORE COMPETENCIES** ***Keys to Successful Implementation***

- Base all assessments on core competencies only
- Publicize this fact to learners & teachers
- Discourage teaching contrary to core competencies
- Encourage teaching supplemental to core competencies—but do not assess students on supplemental information or skills
- Assessing only core competencies leads to improved:
  - Retention of knowledge & skills
  - Learner confidence
  - Enthusiasm for the topic
  - Comprehension of supplemental learning

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## **D** DELIBERATE PRACTICE FOR SKILLS TRAINING...*Evolution of a Concept*

- The value of experience is not in seeing much but in seeing wisely—*Sir William Osler 1849-1919*
- Know that by practice alone can you become an expert—*Sir William Osler 1849-1919*
- Practice does not make perfect. Only perfect practice makes perfect—*Vince Lombardi 1913-1970*
- Expert performance can be traced to active engagement in deliberate practice, where training (often designed and arranged by teachers and coaches) is focused on improving particular tasks—*K Anders Ericsson 2008*

***“Experience” & “practice” are equally important to achieve competence & expertise. This is true for all skill-based professionals (e.g., athletes, musicians, dancers, pilots, chess masters—and health professionals).***

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## **D** DELIBERATE PRACTICE FOR SKILLS TRAINING...*Definition & Components*

- Focused, repetitive practice consisting of domain-related activities necessary for improving performance & advancement to the level of expert
- Essential components include:
  - Motivated & attentive learner
  - Well-defined task and goals
  - Appropriate level of difficulty
  - Informative feedback from educational sources
  - Opportunities for repetition & refinements

*Modified from  
Ericsson KA et al. Psychol Rev. 1993;100 (3):363-406  
Ericsson KA Acad Emerg Med. 2008;15:988-94  
McGaghie et al. Acad Med. 2011;86:706-11*

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## **D** DELIBERATE PRACTICE FOR SKILLS TRAINING...*Practical Implementation*

- Clinical environment alone is not conducive to consistent & comprehensive implementation of DP
- Standardized curriculum that includes simulation is the only practical solution for DP implementation
  - Standardized patients (SPs)
  - Objective structured clinical exams (OSCEs)
  - Low-fidelity & high-fidelity simulators
  - Oral & written patient presentations
  - Case-based learning
  - Role-playing
  - Gaming
  - Multimedia – videos, avatars, etc.
  - Online delivery

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## **E** EXPERIENTIAL PARALLEL TO STANDARDIZED LEARNING...*Directors*

### **Clinical experience:**

- Is ultimate & most valid venue for formative assessment of skills, attitudes, & behaviors
- Improves efficacy of deliberate practice—provides context, with improved motivation & attention
- Must be associated with deliberate practice to improve learner performance
- Must be parallel to standardized curriculum—concurrent & consistent
  - Must affirm
  - Can never contradict
  - Preferably supplements



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## **E** EXPERIENTIAL PARALLEL TO STANDARDIZED LEARNING...*Attendings*

*Clinical preceptors can optimize student skill acquisition and performance by providing an environment:*

1. Consistent with core competencies established by the course director
2. Conducive to deliberate practice
3. With optimal balance of support & challenge

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## **F** FORMATIVE & SUMMATIVE ASSESSMENTS...*Principles & Definitions*

- General principles
  - Validity (appropriateness)
  - Reliability (consistency)
  - Feasibility (practicality)
- Formative assessment (feedback—without grade)
- Summative assessment (graded testing)
  - Make tests pertinent, assess core competencies
  - Set appropriate standards (minimal competence)
    - Overall course
    - Specific competencies
  - Use criterion-referenced (not norm-referenced) grading
  - Monitor results for course QI (curriculum evaluation)

***Assessment drives learning—  
accept & embrace it!  
You should teach to the test.***


Wass et al., 2001

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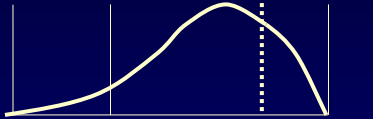
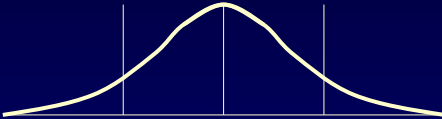



## G GRADING CRITERION REFERENCED (MASTERY TEACHING)...vs. Norm Referenced

<p><b><u>Criterion-Referenced (Absolute)</u></b></p> <ul style="list-style-type: none"> <li>■ Individual vs. fixed standard (criterion)</li> <li>■ Standard                     <ul style="list-style-type: none"> <li>➢ Absolute—knowledge or skill learner must have in order to pass</li> <li>➢ Based on instructor's judgment</li> <li>➢ Known in advance (objectives)</li> </ul> </li> <li>■ Purpose is to assess competence                     <ul style="list-style-type: none"> <li>➢ Mastery testing/assumption</li> <li>➢ Most students should perform well (common mastery level 85%)</li> <li>➢ Bell-shaped curve skewed to right</li> <li>➢ Items assess core competencies, linked to objectives</li> <li>➢ Diagnostic feedback relative to performance is clear</li> </ul> </li> </ul>	<p><b><u>Norm-Referenced (Relative)</u></b></p> <ul style="list-style-type: none"> <li>■ Individual vs. others</li> <li>■ Standard                     <ul style="list-style-type: none"> <li>➢ Relative—based on class test results (mean/standard deviation)</li> <li>➢ Influenced by examinees' abilities</li> <li>➢ Not known in advance</li> </ul> </li> <li>■ Purpose is to discriminate                     <ul style="list-style-type: none"> <li>➢ Normative assumption</li> <li>➢ Guaranteed some will fail</li> <li>➢ Bell-shaped curve, variable scores</li> <li>➢ Items assess broad content, not linked to local objectives</li> <li>➢ Diagnostic feedback relative to performance unclear</li> </ul> </li> </ul>
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## G GRADING CRITERION REFERENCED (MASTERY TEACHING)...Sample Curves

<p><b>CRITERION-REFERENCED GRADING</b></p> <p><i>Comparison to fixed standards</i></p>  <p>Minimal CP HP 100%</p> <p>CP = Competent performer              HP = High performer</p>	<p><b>NORM-REFERENCED GRADING</b></p> <p><i>Comparison to other students</i></p>  <p>SD Mean SD</p>
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## **G** GRADING CRITERION REFERENCED (MASTERY TEACHING)...*Assessment Goals*

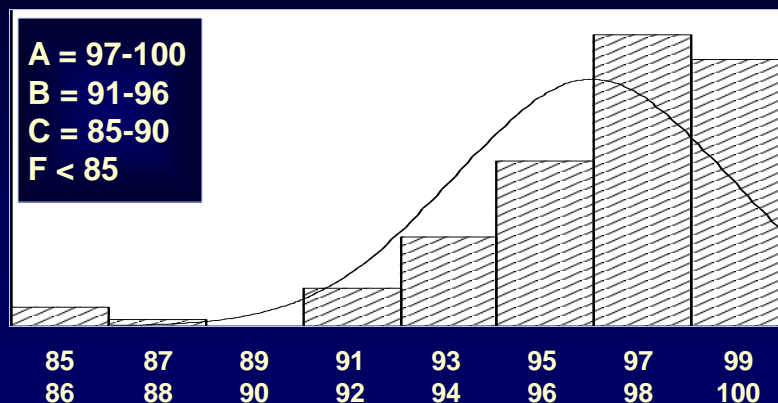
- Curriculum vs. learner
  - Outside test (e.g., NBME subject or “shelf” test)
    - Ensures question quality & security, saves time for educator
    - Conflicts w/ curricular alignment, assesses curriculum > learner
  - Internal test (created by curriculum developer)
    - Ensures curricular alignment, assesses learner > curriculum
    - Extramural consistency: base course on consensus statement
    - Quality: use question-writing guidelines & external review
    - Security & time: use same test repeatedly, but review tests personally in group format, never publish tests or questions
- Competency vs. rank (lump vs. separate)
  - Assessing competency requires criterion-referenced grading, which is dichotomous (lumps)
  - Dichotomous grading does not preclude concurrent learner discrimination/ranking using scalar grading (separates)

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## **G** GRADING CRITERION REFERENCED (MASTERY TEACHING)...*with Scalar Grading*

*Curve is shifted to right (criterion-referenced), but there are still high, average, and low performers (scalar)*



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## H HOMogeneity (STANDARDIZATION)

- Curriculum based on mastering **core competencies** and **deliberate practice** requires that ALL students receive an equivalent—homogeneous or standardized—learning experience
- “Standardized” curriculum:
  - Is highly structured
  - Requires punctual & mandatory attendance
  - Takes precedence over ward responsibilities
  - Requires full attention of learners (pagers & phones off)
  - Accounts for majority of grade, but not student time
  - Requires strong, well-organized course director

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## I INSTITUTIONAL SUPPORT *Leadership commitment*

- Curriculum champion
  - Faculty member delegated (not relegated) as director with mettle, motivation, authority, & protected time
  - Buy-in ability and bypass authority
- Schedule
  - 100% learner attendance
  - Cooperation of dept. (chair/faculty) & school (deans)
  - Simulation exercises, e.g., SPs, OSCEs, skills center
- Resources
  - Director  $\geq$  50% FTE, coordinator  $\geq$  50% FTE
  - Simulation / SP costs
  - Instructors (faculty / residents / nurses)

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## COMPETENCY-BASED EDUCATION: 10 ESSENTIAL FEATURES (THE ABCs)

- Alignment of curriculum
- Blended learning environment
- Consistency—extramural & intramural
- Core competencies
- Deliberate practice for skills training
- Experiential parallel to standardized learning
- Formative & summative assessments
- Grading criterion referenced (mastery testing)
- Homogeneity (standardization)
- Institutional support

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## OPTIMAL CLINICAL-LEARNING ENVIRONMENT IN COMPETENCY-BASED CURRICULUM

*Three key factors:*

1. Consistent with core competencies established by the course director
2. Conducive to deliberate practice
3. With optimal balance of support & challenge



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# THE END

The following 12 slides consist of  
 outcomes data (9 slides) and  
 references (3 slides)

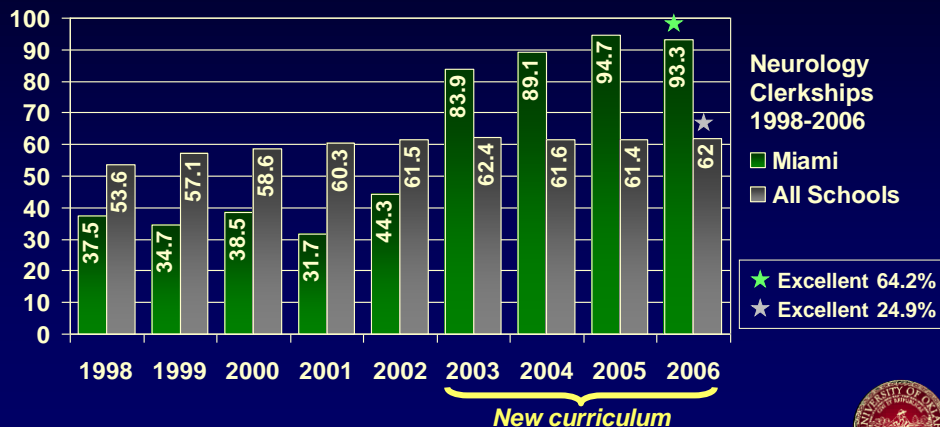
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## EFFECT OF COMPETENCY-BASED CURRICULUM MIAMI NEUROLOGY CLERKSHIP 1998-2006 AAMC Graduation Questionnaires

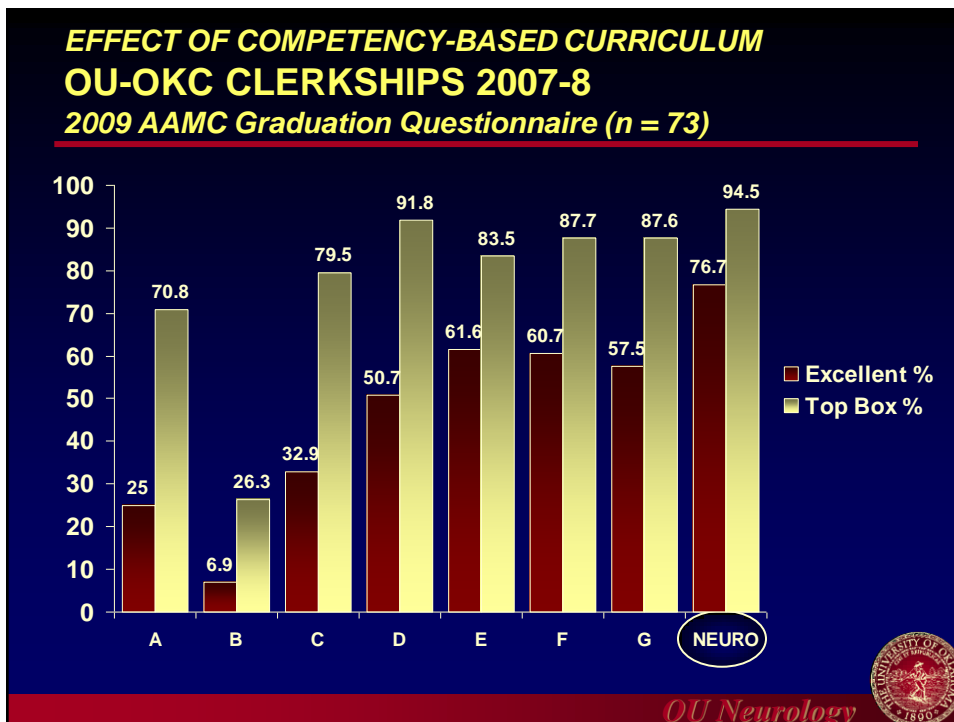
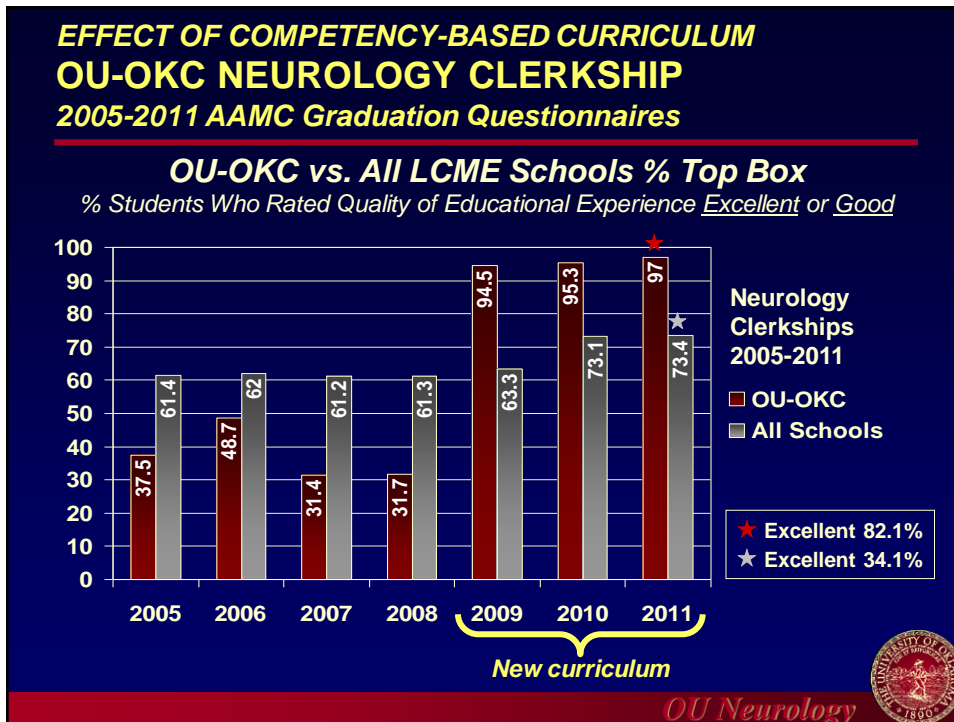
### UMiami vs. All LCME Schools % Top Box

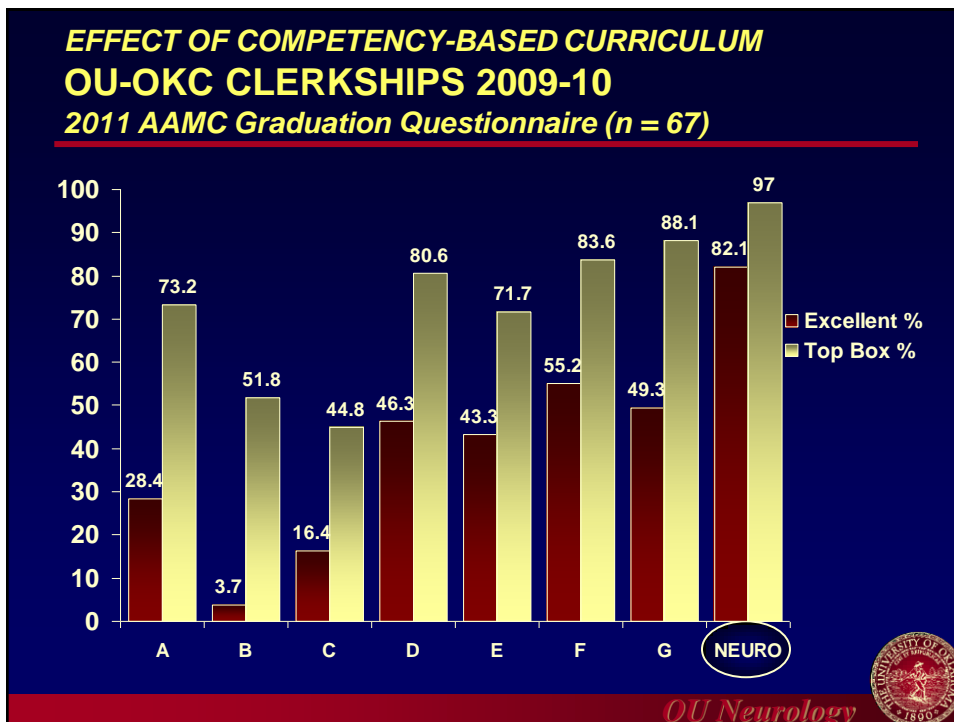
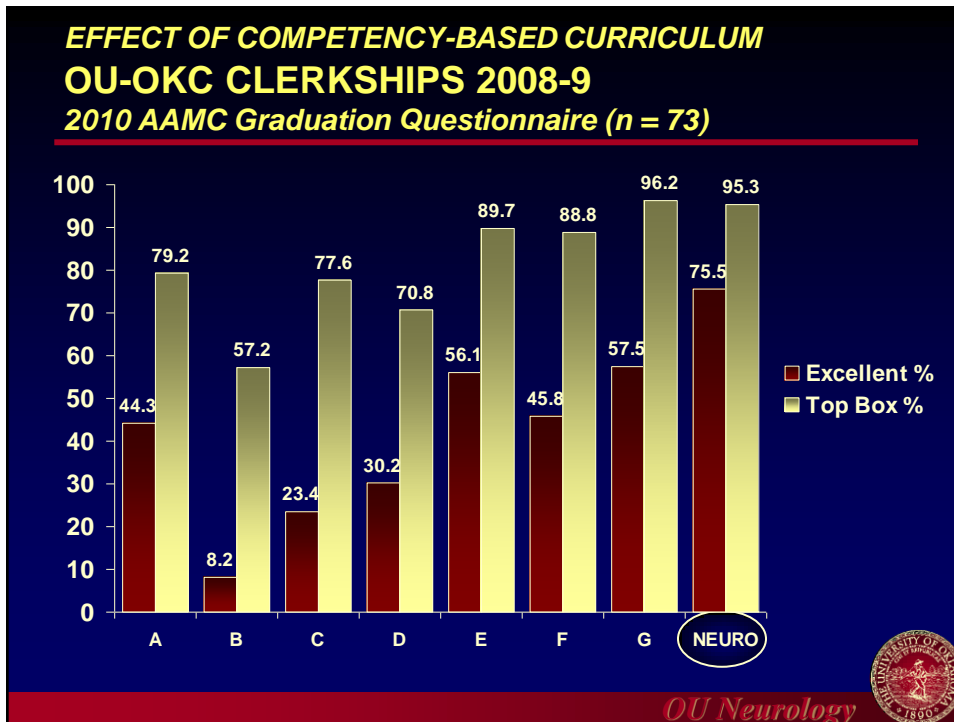
% Students Who Rated Quality of Educational Experience Excellent or Good

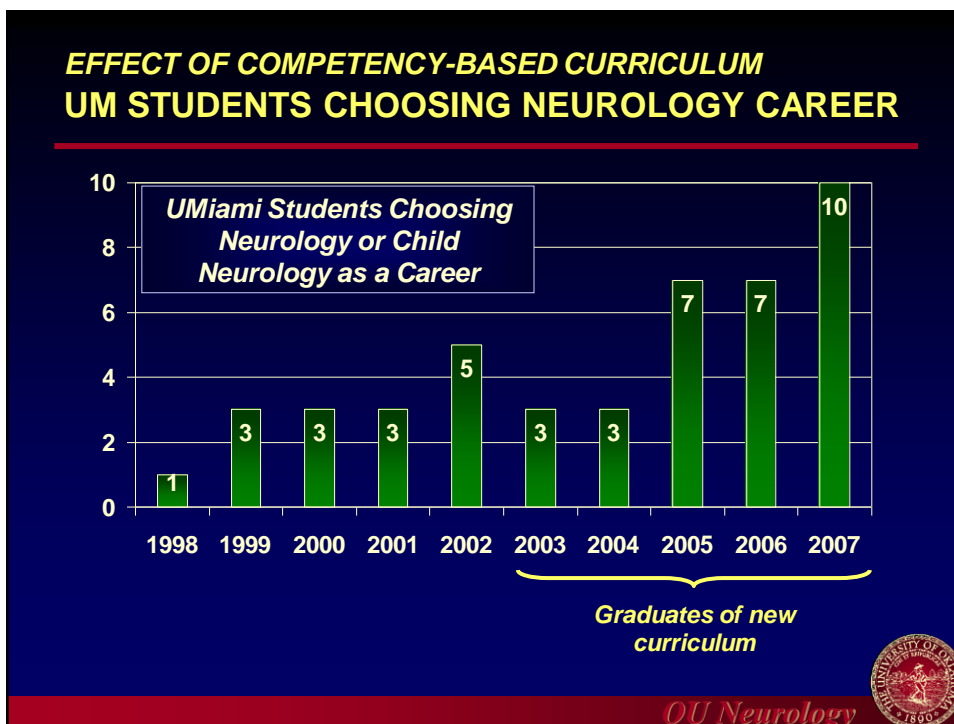
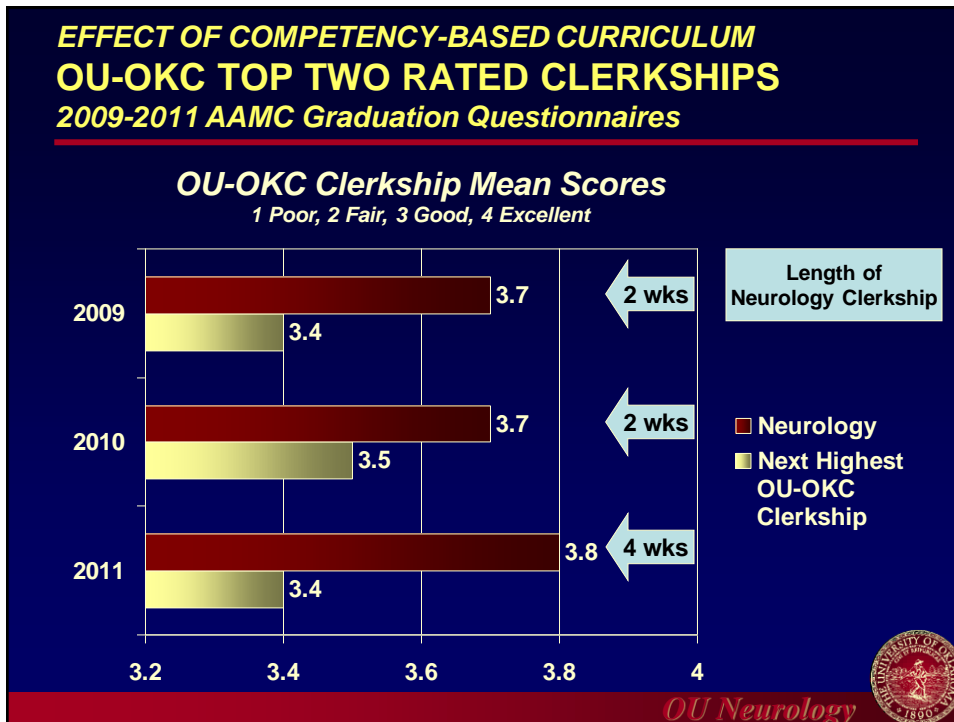


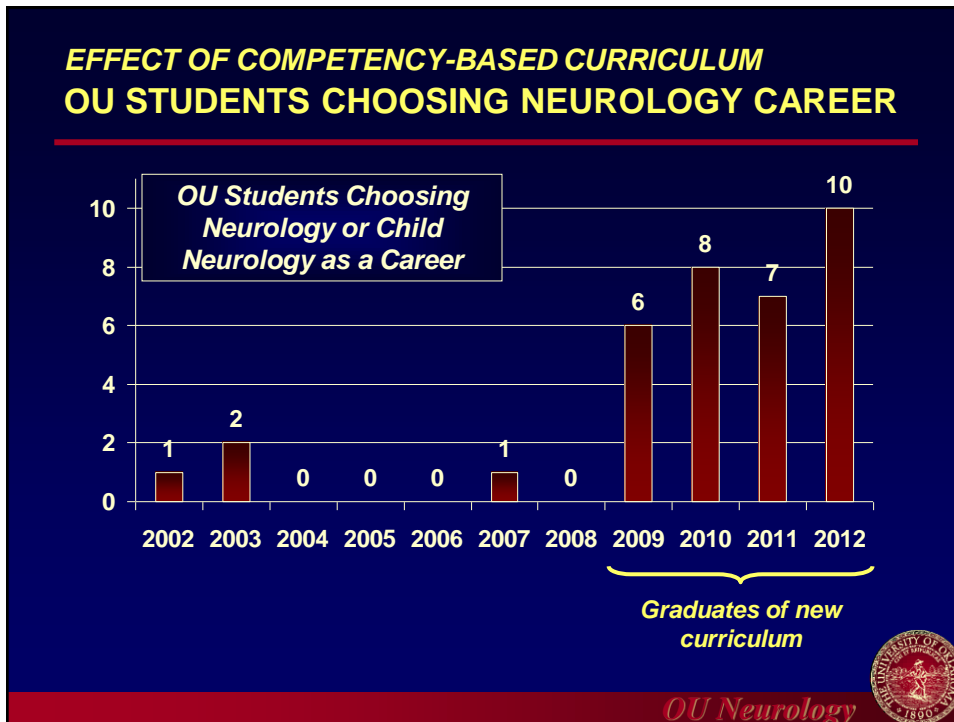
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### EFFECT OF COMPETENCY-BASED CURRICULUM NEUROLOGY DEPARTMENT TEACHING AWARDS

TEACHING AWARD	Before 2007	After 2007
Stanton L. Young Master Teacher Award (f. 1984)	Peggy W. Wisdom 1996	Herman E. Jones 2009 David Lee Gordon 2011
Edgar W. Young Lifetime Achievement Award (f. 1987)		Herman E. Jones 2011
M2 Aesculapian Award – To Faculty (f. 1962)	Herman E. Jones 2006	
M3 Aesculapian Award – To Resident (f. 1975)		AJ Vaughn 2011
M4 Aesculapian Award – To Faculty (f. 1962)	Gunter Haase 1964	Herman E. Jones 2009

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## SELECT TEXTBOOK REFERENCES

- Dent JA, Harden RM. ***A Practical Guide for Medical Teachers***. 3<sup>rd</sup> ed. Edinburgh: Churchill Livingstone; 2009
- Fincher RME, Cox S, DaRosa DA, Lynn DJ, Margo K, Morgenstern BZ, Pangaro LN, Sierles FA. ***Guidebook for Clerkship Directors***, 3<sup>rd</sup> edition. Omaha: Alliance for Clinical Education; 2005
- Huston T. ***Teaching What You Don't Know***. Cambridge, Mass.: Harvard University Press; 2009
- Kern DE, Thomas PA, Howard DM, Bass EB. ***Curriculum Development for Medical Education. A Six-Step Approach***. Baltimore: The Johns Hopkins University Press; 1998
- Norman GR, van der Vleuten CPM, Newble DI. ***International Handbook of Research in Medical Education***. Dordrecht: Kluwer Academic Publishers; 2002

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## SELECT ARTICLE REFERENCES, 1 of 2

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- Ericsson KA, Krampe RT, Tesch-Römer C. The role of deliberate practice in the acquisition of expert performance. *Psychological Review* 1993;100:363-406
- Ericsson KA. Deliberate practice and acquisition of expert performance: a general overview. *Acad Emerg Med* 2008;15:988-994
- McGaghie WC, Issenberg SB, Cohen ER, Barsuk JH, Wayne DB. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. *Acad Med* 2011;86:706-711

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## SELECT ARTICLE REFERENCES, 2 of 2

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- Miller GE. The assessment of clinical skills / competence / performance. *Acad Med* 1990;65:S63-S67
- Smith SR, Dollase RH, Boss JA. Assessing students' performance in a competency-based curriculum. *Acad Med* 2003;78:97-107
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# THE END

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