



ESTRELLA MOUNTAIN COMMUNITY COLLEGE

Fall 2001  
California Critical Thinking Skills Test  
Assessment Results

February 21, 2002

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*M a r i c o p a C o m m u n i t y C o l l e g e s*

# California Critical Thinking Skills Test Results Summary

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## Background

This report summarizes the results of the fall 2001 implementation of the California Critical Thinking Skills Test (CCTST). The CCTST is designed to measure critical thinking, characterized as the process of purposeful, self-regulatory judgment. A subcommittee of the Estrella Mountain Student Academic Achievement Steering Committee selected this instrument to provide the college with an additional measure of general education attainment that could be administered in a 50-minute class period.

The test consists of 34 multiple-choice questions designed to measure critical thinking using two sub-scales. The primary sub-scale includes Analysis, Evaluation, Inference and the secondary sub-scale includes Deduction and Induction. See Appendix A for definitions of the primary sub-scale. The sub-scales are provided as gross indicators of an overall group's strengths and weaknesses. California Academic Press states that "these sub-scales are entirely theoretically based and not derived from a factor analysis extraction that requires scales to be orthogonal to each other. In fact, the cognitive skills of critical thinking, as defined, do not act as independent or isolated factors."

## Methodology

In the fall of 2001, the Student Academic Achievement Steering Committee asked for faculty teaching credit courses to volunteers to pilot the CCTST in their class. All students enrolled in classes were asked to participate in the assessment. Twelve faculty members volunteered, representing 42 sections. Duplicated enrollment across all of the sections was approximately 800. After accounting for students who were enrolled in more than one of these sessions, it was determined that there were 570 unduplicated students.

Assessment packets for each selected class were distributed to all faculty volunteers. The test was administered in their classes between October 22 and October 26. Four hundred and fifteen assessments were returned; however, 53 assessments were immediately discarded because they did not complete the demographic questions or the assessment was a duplicate (same student completed more than one assessment). Three hundred and sixty-two valid assessments remained, representing a 63% response rate.

The Office of Planning and Institutional Effectiveness separated the assessments into the following cohorts and categories:

- Great Entering Cohort (119 assessments): new students with a degree or transfer intent, less than two EMCC courses completed and no previous college experience.
- Semi-Experienced Cohort (28 assessments): students with between 6 and 20 EMCC credit hours and no previous college experience.
- GrEAT Experienced Cohort (54 assessments): students with 20 or more general education hours completed at EMCC.
- Excluded (161 assessments): Student who had previously attended other colleges and had less than 20 EMCC general education hours.

The only two cohorts that were analyzed are the GrEAT Entering and GrEAT Experienced Cohorts. These two cohorts combined represent just under half of the valid assessments returned.

Assessments were sent to California Academic Press for scoring. Basic descriptive statistics provided by California Academic Press included mean, median, trimmed mean (the mean of the middle 90% of the data – used to remove outlier effect), standard deviation, standard error of the mean, minimum, maximum, and first and third quartiles. In addition, two-sample t-tests were used to determine if the differences in the mean scores between the GrEAT Entering and GrEAT Experienced cohorts were significant.

## **Limitations:**

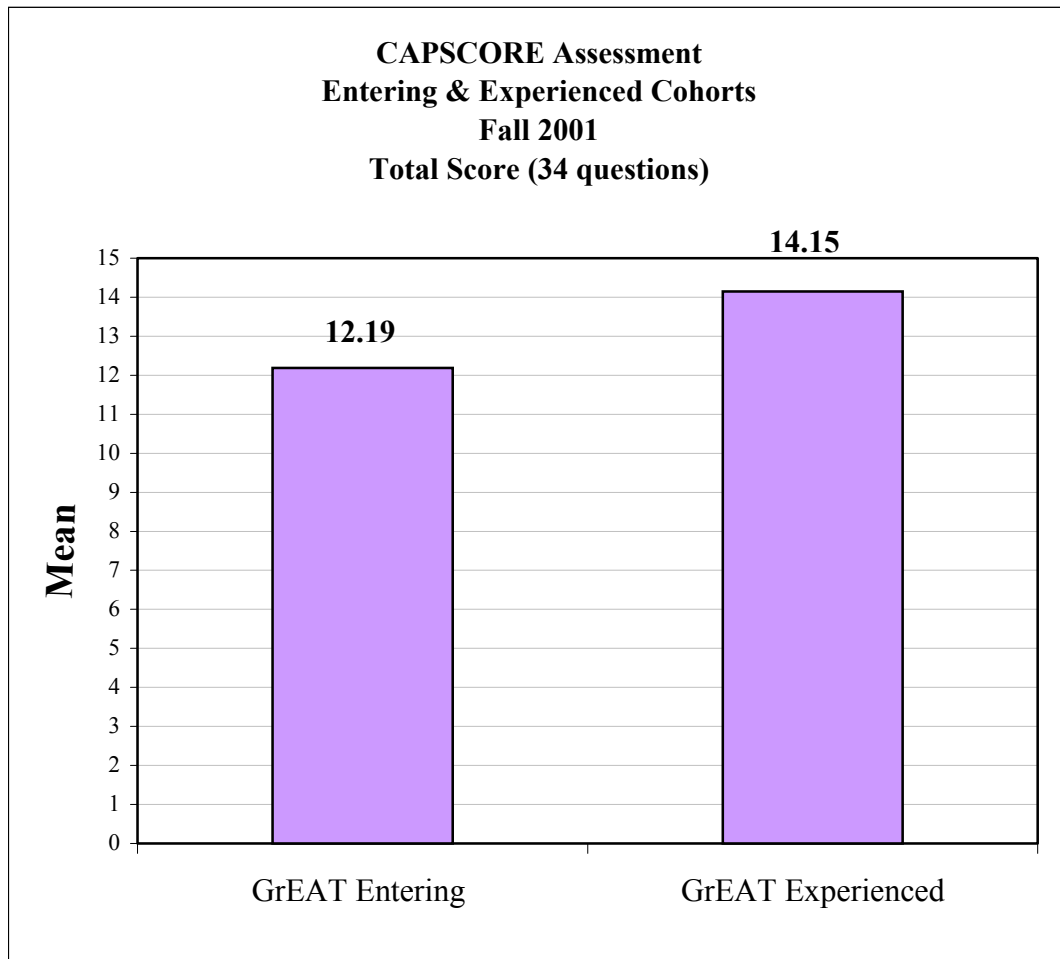
- Students in the entering and experienced cohorts were not randomly selected to participate in this assessment. It is possible that the sample is not truly representative of the EMCC student population and statistical difference between subgroups of the population may be caused by factors related to the sampling technique (convenience sample) and not by the characteristics of the populations being studied.
- Cross sectional studies can be skewed by external variables such as work experience and motivational differences between the cohorts.
- California Academic Press has not yet published normative data for the sub-scale scores.

## Key Findings, Inferences and Observations

- In all cases (Total, Analysis, Inference, Evaluation, Induction, and Deduction), the experienced cohort performed better than the entering cohort. Significant differences were found for the Total score and also for the Inference, Evaluation, and Induction sub-scales.
- Based on mean scores, the combined entering and experienced cohort scored between the 38<sup>th</sup> and 44<sup>th</sup> percentile as compared to a sample set of other two-year college students. The combined score is heavily weighted by the entering cohort since over two-thirds of the cohort consists of entering students. If the two cohorts are examined separately, the entering cohort scored between the 38<sup>th</sup> and 44<sup>th</sup> percentile and the experienced cohort scored between the 54<sup>th</sup> and 63<sup>rd</sup> percentile.
- For the primary sub-scale, students in both cohorts scored best in Analysis and worst in Evaluation. On the secondary sub-scale, students from both cohorts scored better on Induction than Deduction.
- While Evaluation represented the lowest relative score, this area of the primary sub-scale represented the area of greatest gain between the entering and experienced cohort and was statistically different at the .05 level.
- The highest relative score was in Analysis and this sub-scale showed the smallest gain. Relative mean scores were only 11% higher for the Experienced Cohort (other sub-scale areas resulted in 15% to more than 20% higher relative scores for the GrEAT Experienced Cohort).

**Total  
California Critical Thinking Test Results  
Two Sample T-Test: Total Score  
EMCC GrEAT Entering and Experienced Cohorts Fall 2001**

<b>Two Sample T-Test</b>				
	<b>N</b>	<b>Mean</b>	<b>St Dev</b>	<b>SE Mean</b>
<b>GrEAT Entering Cohort</b>	119	12.19	3.8	0.35
<b>GrEAT Experienced Cohort</b>	54	14.15	5.01	0.68
<b>Difference Estimate = -1.95</b>				
95% Confidence Difference: (-3.479, -0.431)				
T- Value -2.55, P-Value .013, DF 81				



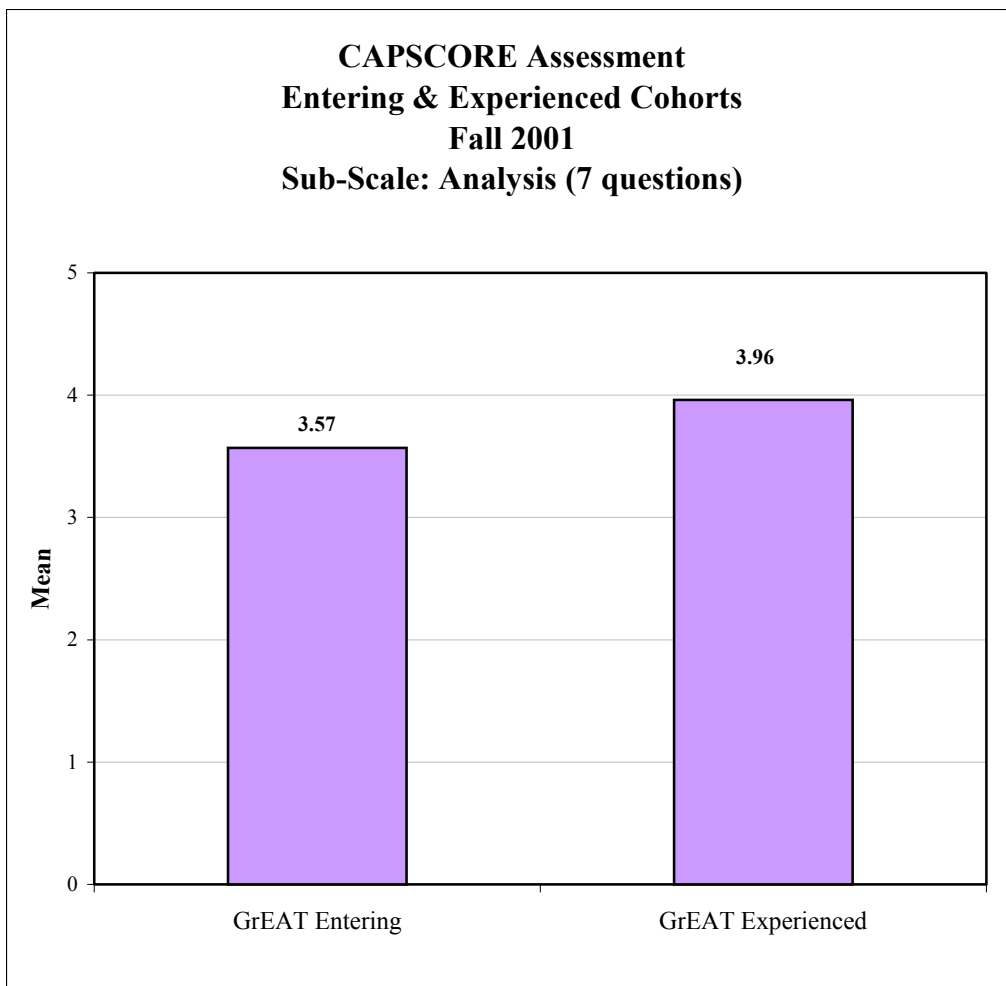
## Analysis

### California Critical Thinking Test Results

#### Two Sample T-Test: Sub-Scale Analysis

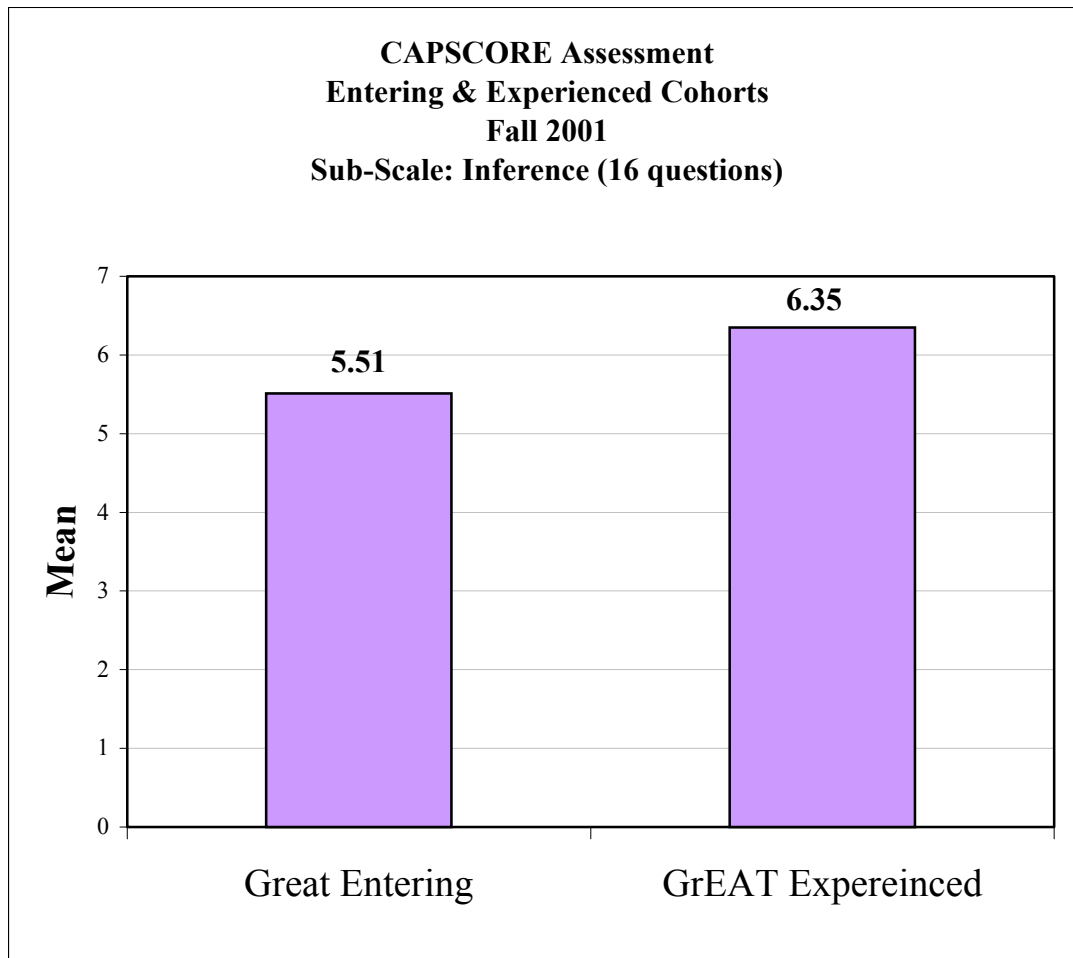
#### EMCC GrEAT Entering and Experienced Cohorts Fall 2001

Two Sample T-Test				
	N	Mean	St Dev	SE Mean
GrEAT Entering Cohort	119	3.57	1.54	0.14
GrEAT Experienced Cohort	54	3.96	1.47	0.2
<b>Difference Estimate = -0.392</b>				
95% Confidence Difference: (-0.876, -0.093)				
T- Value -1.60, P-Value 0.112, DF 107				



**California Critical Thinking Test Results**  
**Two Sample T-Test: Sub-Scale Inference**  
**EMCC GrEAT Entering and Experienced Cohorts Fall 2001**

<b>Two Sample T-Test</b>				
	<b>N</b>	<b>Mean</b>	<b>St Dev</b>	<b>SE Mean</b>
GrEAT Entering Cohort	119	5.51	2.24	0.21
GrEAT Experienced Cohort	54	6.35	2.62	0.36
<b>Difference Estimate = -0.839</b>				
95% Confidence Difference: (-1.657, -0.021)				
T- Value -2.04, P-Value 0.044, DF 89				



## Evaluation

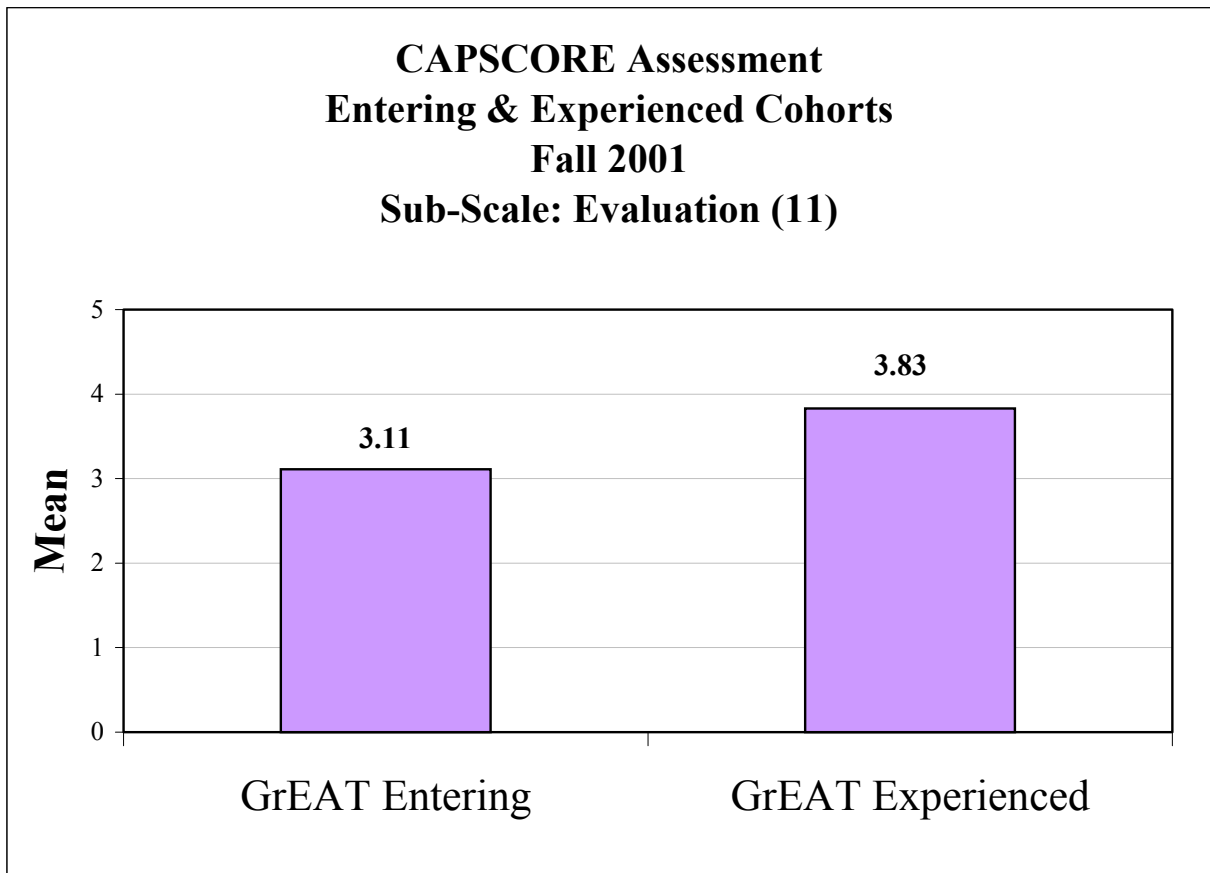
### California Critical Thinking Test Results

#### Two Sample T-Test: Sub-Scale Evaluation

#### EMCC GrEAT Entering and Experienced Cohorts Fall 2001

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Two Sample T-Test				
	N	Mean	St Dev	SE Mean
GrEAT Entering Cohort	119	3.11	1.56	0.14
GrEAT Experienced Cohort	54	3.83	1.94	0.26
<b>Difference Estimate = -0.724</b>				
95% Confidence Difference: (-1.321, -0.127)				
T- Value -2.41 P-Value 0.018, DF 85				



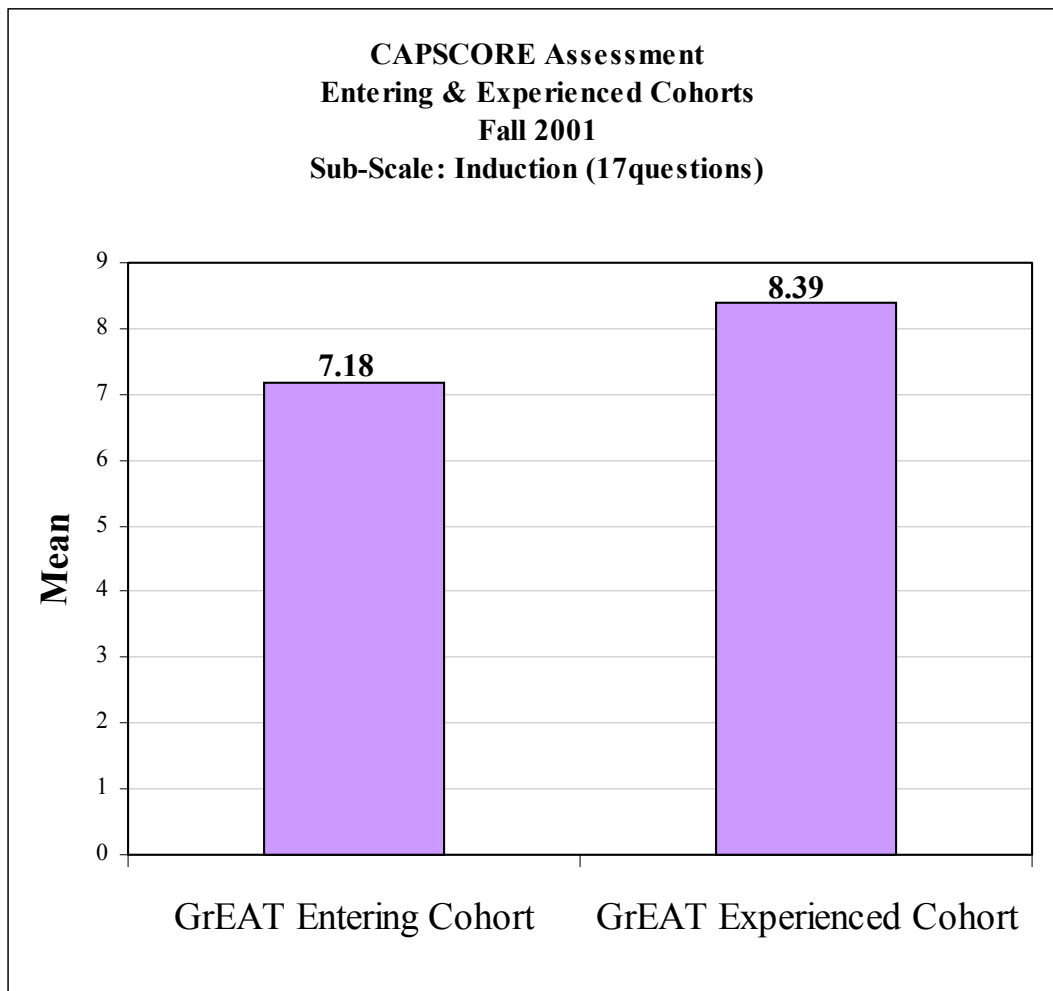
## Induction

### California Critical Thinking Test Results

#### Two Sample T-Test: Sub-Scale Induction

#### EMCC GrEAT Entering and Experienced Cohorts Fall 2001

Two Sample T-Test				
	N	Mean	St Dev	SE Mean
GrEAT Entering Cohort	119	7.18	2.44	0.22
GrEAT Experienced Cohort	54	8.39	2.77	0.38
<b>Difference Estimate = -1.204</b>				
95% Confidence Difference: (-2.075, -0.333)				
T- Value -2.75, P-Value 0.007, DF 91				



## Deduction

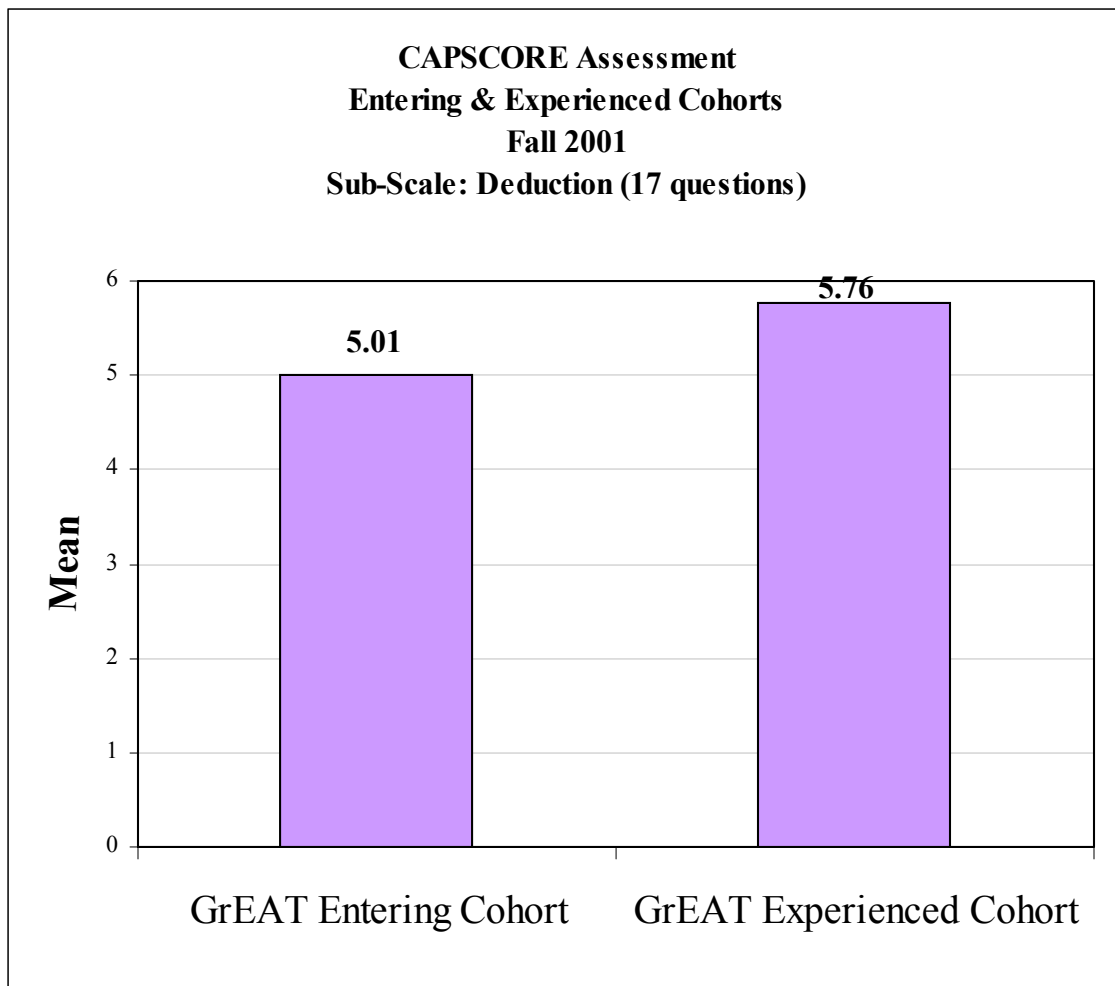
### California Critical Thinking Test Results

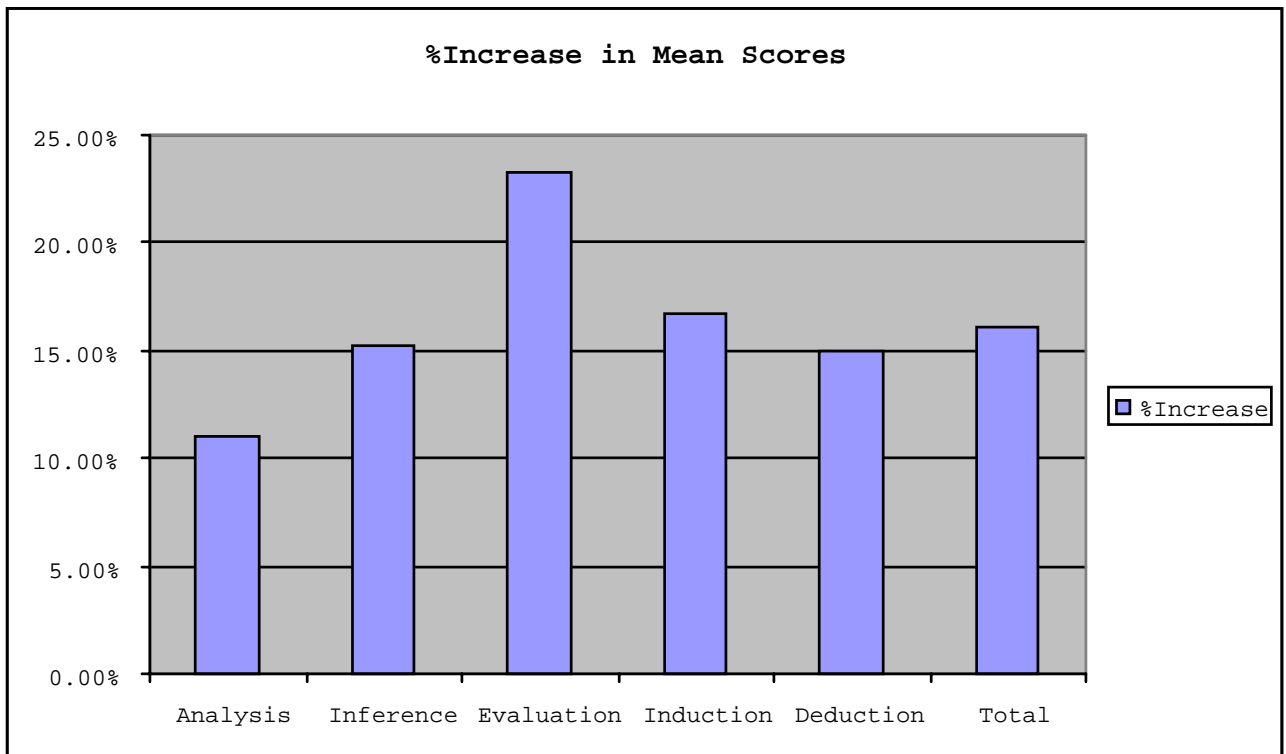
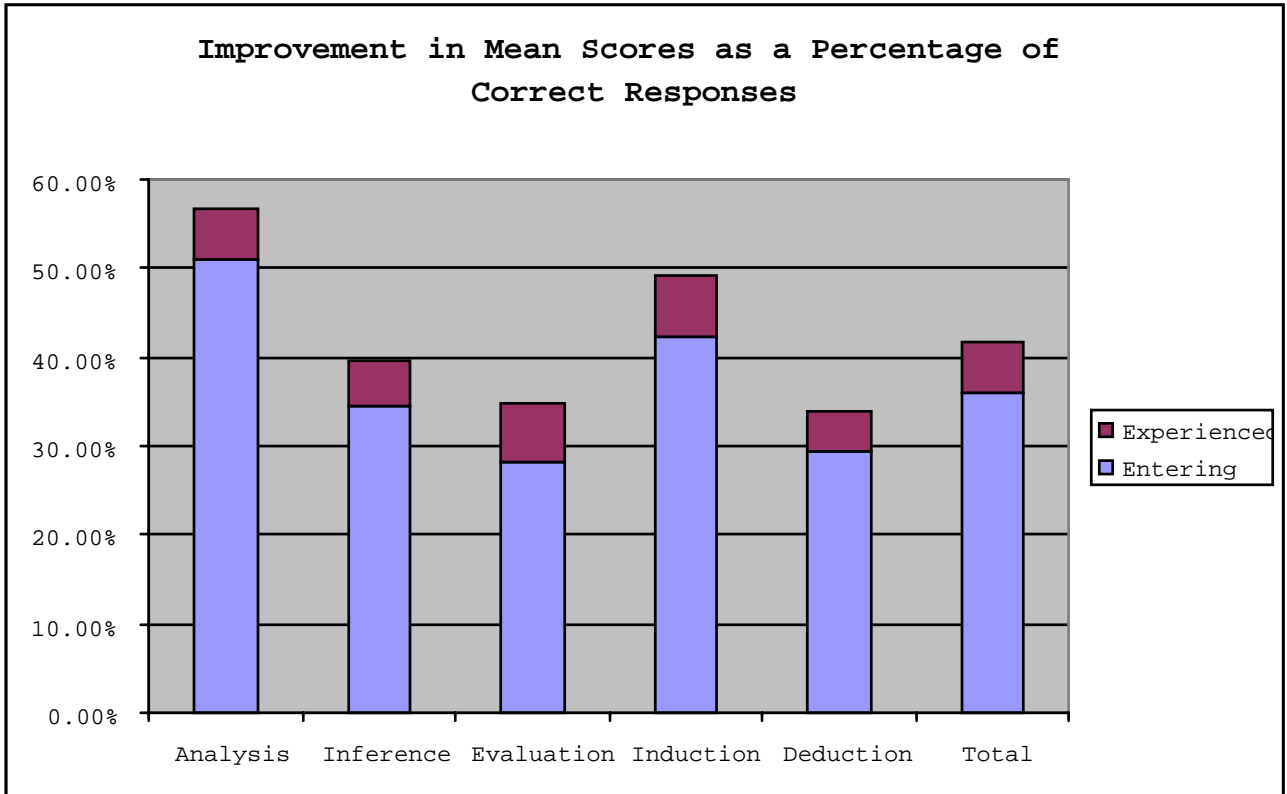
#### Two Sample T-Test: Sub-Scale Deduction

#### EMCC GrEAT Entering and Experienced Cohorts Fall 2001

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Two Sample T-Test				
	N	Mean	St Dev	SE Mean
GrEAT Entering Cohort	119	5.01	2.15	0.2
GrEAT Experienced Cohort	54	5.76	2.82	0.38
<b>Difference Estimate = -.751</b>				
95% Confidence Difference: (-1.610, 0.108)				
T- Value -1.74, P-Value .086, DF 82				





## Appendix A

### California Academic Press Skill Definitions

***Analysis***, as used on the CCTST, has a dual meaning. First it means “to comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria,” which includes the sub-skills of categorization, decoding significance, and clarifying meaning. Analysis on the CCTST also means “to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, reasons, information or opinions,” which includes the sub-skills of examining ideas, detecting arguments, and analyzing arguments into their component elements.

***Evaluation***, as used on the CCTST, has a dual meaning. First it means “to assess the credibility of statements or other representations which are accounts or descriptions of a person’s perception, experience, situation, judgment, belief or opinion; and to assess the logical strength of the actual or intended inferential relationships among statement, descriptions, questions, or other forms of representations,” which includes the sub-skills of assessing claims and assessing arguments. Evaluation on the CCTST also means “to state the results of one’s reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations upon which one’s results were based; and to present one’s reasoning in the form of cogent arguments” which includes the sub-skills of stating results, justifying procedures, and presenting arguments.

***Inference***, as used on the CCTST, means “to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses, to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation,” which includes the sub-skills of querying evidence, conjecturing alternatives, and drawing conclusions.