

# **CAAP Critical Thinking Test Summary**

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# CAAP Critical Thinking Test Summary

## Introduction

The Collegiate Assessment of Academic Proficiency (CAAP) is a standardized, nationally-normed assessment program from ACT that enables postsecondary institutions to assess, evaluate, and enhance student learning outcomes and general education program outcomes. There are six different CAAP tests that institutions can choose to administer: Reading, Writing Skills, Writing Essay, Mathematics, Science, and Critical Thinking.

Owens adopted the CAAP Critical Thinking test in the Spring of 2009, and it is administered every year to students enrolled in randomly-chosen sections of select 200-level courses. The test is 40 minutes in length and includes 32 items that measure students' skills in clarifying, analyzing, evaluating, and extending arguments. An argument is defined as a sequence of statements that includes a claim that one of the statements, the conclusion, follows from the other statements. The Critical Thinking Test consists of four passages that are representative of the kinds of issues commonly encountered in a postsecondary curriculum.

A passage typically presents a series of sub-arguments in support of a more general conclusion or conclusions. Each passage presents one or more arguments using a variety of formats, including case studies, debates, dialogues, overlapping positions, statistical arguments, experimental results, or editorials. Each passage is accompanied by a set of multiple-choice test items. A sample passage with test items is provided in Appendix A.

As indicated in Table 1, test questions fall within one of three content categories. Between 17 and 21 test questions (53 – 66% of questions) assess students' analysis of elements of an argument, between 5 and 9 (16 – 28%) assess students' evaluation of an argument, and 6 (19%) questions assess students' extension of an argument.

**Table 1. Content Specifications Summary for the CAAP Critical Thinking Test**

Content Category	Proportion of Test	Number of Items
Analysis of elements of an argument	.53–.66	17–21
Evaluation of an argument	.16–.28	5–9
Extension of an argument	.19	6
<b>Total</b>	<b>1.00</b>	<b>32</b>

## Methodology

In March 2013, the Critical Thinking Test was administered to students enrolled in 28 randomly-selected sections of the following courses: Biology 212, Chemistry 201, Economics 201, Economics 202, Education 210, Education 280, English 200, Government 207, Humanities 275, Psychology 215, Psychology 220, Psychology 260, Sociology 220 and Sociology 260. All of these classes were 200-level courses identified as having a critical thinking element in the curriculum. A total of 679 students were enrolled in the selected sections during the spring of 2013 and 372 completed the test, resulting in

a 54.8% response rate and a 4.5% margin of error<sup>1</sup>. Table 2 shows self-reported demographic characteristics of test respondents.

**Table 2. Demographic Characteristics of Test Respondents 2013**

<b>Ethnicity</b>	<b>#</b>	<b>%</b>	<b>Status</b>	<b>#</b>	<b>%</b>	<b>Major</b>	<b>#</b>	<b>%</b>
African American/Black	39	10%	Full-time	249	67%	Undecided	13	3%
Amer. Indian/Alaskan Nat.	1	0%	Part-time	111	30%	Agriculture	0	0%
White/Caucasian	269	72%	No response	12	3%	Architecture	1	0%
Mexican American/Chicano	11	3%	<b>Cum GPA</b>			Biological Sciences	12	3%
Asian/Pacific Islander	5	1%	Below 2.00	7	2%	Business	34	9%
Puerto Rican/Cuban/Hisp.	2	1%	2.01 - 2.50	59	16%	Office Management	4	1%
Filipino	0	0%	2.51 - 3.00	84	23%	Marketing & Purchasing	2	1%
Other	9	2%	3.01 - 3.50	100	27%	Communications	10	3%
Prefer not to respond	16	4%	3.51 and above	104	28%	Community Services	28	8%
No response	20	5%	No response	18	5%	Computer & Info. Sciences	2	1%
<b>Gender</b>			<b>Rank (self-reported)</b>			General Studies	4	1%
Male	122	33%	Freshman	66	18%	Education	43	12%
Female	241	65%	Sophomore	173	47%	Engineering	10	3%
No response	9	2%	Junior	60	16%	Fine & Applied Arts	10	3%
<b>Age</b>			Senior	24	6%	Foreign Languages	0	0%
18 and under	45	12%	Other	34	9%	Health Professions	112	30%
19 - 20	81	22%	No response	15	4%	Home Economics	4	1%
21 - 25	111	30%	<b>Enrolled at Owens as Freshmen</b>			Letters	2	1%
26 - 30	46	12%	Yes	262	70%	Mathematics	2	1%
31 - 39	42	11%	No	98	26%	Philosophy/Religion	1	0%
40 and older	47	13%	No response	12	3%	Physical Sciences	2	1%
No response						Social Sciences	27	7%
						Trade & Industrial	4	1%
						No response	45	12%

### Summary of Test Results

As a general guide, differences in scores should be interpreted based on the standard deviation of the score distribution. Standard deviations are a measure of variation in the data such that 68% of scores fall within one standard deviation of the mean ( $60.9 \pm 5.4 = 55.5 - 66.3$ ), 95% fall within two standard deviations ( $60.9 \pm 10.8 = 51.1 - 71.7$ ), and 98% are within three standard deviations ( $60.9 \pm 16.2 = 44.7 - 77.1$ ). Consequently, differences of one standard deviation or less are considered negligible, differences between one and two standard deviations are considered moderate, and differences between two and three or more are considered substantial.

<sup>1</sup> The margin of error is a statistic that reflects the amount of sampling error in a survey's results and is based on the size of the sample (n=372) in relation to the size of the population (N=1,770 students enrolled in all sections of the surveyed courses during the Spring of 2013). The lower the margin of error, the more confidence one can have that the data are representative of the full population. Ideally, the margin of error should be 5% or less. The way to reduce the margin of error is to increase the sample size (i.e., survey more students).

Based on the guide above, the results (displayed in Table 3) show that (a) Owens students differed very little from the two-year public national average, (b) there was very little change from 2011 to 2012, and (c) there was very little difference among different student groups.

**Table 3: Average Scores by Student Group: Owens 2010-2013 and National Average**

	2013		2012		2011		2010		2013 National Average	
	Avg.	#	Avg.	#	Avg.	#	Avg.	#	Ave.	S.D.
<b>Overall</b>	60.8	372	60.9	422	60.2	291	60.1	107	60.6	5.4
<b>Ethnicity</b>										
African American/Black	57	39	58	33	57	18	54	10	NA	NA
Amer. Indian/Alaskan Nat.		1		2		3			NA	NA
White/Caucasian	61	269	62	298	61	216	61	77	NA	NA
Mexican American/Chicano	60	11	59	7		4		2	NA	NA
Asian/Pacific Islander	59	5	58	7		4		1	NA	NA
Puerto Rican/Cuban/Hispanic		2	62	7				1	NA	NA
Filipino				2		1			NA	NA
Other	57	9	58	15	60	9		4	NA	NA
Prefer not to respond	62	16	63	15	58	12	61	6	NA	NA
No response	60	20	60	36	58	25	57	5	NA	NA
<b>Gender</b>										
Male	62	122	61	117	62	63	61	49	NA	NA
Female	60	241	61	284	60	212	60	56	NA	NA
No response	61	9	60	21	58	16		2	NA	NA
<b>Age</b>										
18 and under	59	45	60	73	59	41	61	10	NA	NA
19 - 20	60	81	61	104	60	79	59	35	NA	NA
21 - 25	61	111	61	115	60	67	60	25	NA	NA
26 - 30	62	46	63	43	62	36	62	15	NA	NA
31 - 39	62	42	61	42	61	42	60	9	NA	NA
40 and older	60	47	60	45	58	26	59	13	NA	NA
No response									NA	NA
<b>Rank (self-reported)</b>										
Freshman	60	66	61	104	60	60	58.7	39	60.6	5.4
Sophomore	61	173	60	169	60	132	60.2	37	60.6	5.4
Junior	61	60	62	68	60	37	61	11	60.6	5.4
Senior	58	24	62	20	61	11	64	7	NA	NA
Other	62	34	61	35	61	20	62	11	NA	NA
No response	59	15	60	26	58	31		2	NA	NA
<b>Enrolled as a Freshmen</b>										
Yes	60	262	61	287	60	212	60	77	NA	NA
No	62	98	61	109	61	57	60	27	NA	NA
No response	59	12	59	26	59	22		3	NA	NA
<b>Status</b>										
Full-time	61	249	61	291	60	191	60	84	NA	NA
Part-time	60	111	62	106	60	79	60	22	NA	NA
No response	59	12	60	25	59	21		1	NA	NA

**Table 3: Average Scores by Student Group: Owens 2010-2013 and National Average (Cont.)**

	2013		2012		2011		2010		2013 National Average	
	Avg.	#	Avg.	#	Avg.	#	Avg.	#	Ave.	S.D.
<b>Cum GPA</b>										
Below 2.00	57	7	60	15	58	10	57	9	NA	NA
2.01 - 3.00	59	59	61	68	59	42	58	15	NA	NA
2.51 - 3.00	60	84	59	82	60	58	59	26	NA	NA
3.01 - 3.50	61	100	61	126	60	86	61	21	NA	NA
3.51 and above	63	104	63	102	62	64	63	27	NA	NA
No response	57	18	60	29	59	31	59	9	NA	NA
<b>Major</b>										
Undecided	60	13	62	10	57	7		3	NA	NA
Agriculture				1				1	NA	NA
Architecture		1		2				1	NA	NA
Biological Sciences	62	12	64	18		3		3	NA	NA
Business	61	34	62	35		3	58	7	NA	NA
Office Management		4		2					NA	NA
Marketing & Purchasing		2							NA	NA
Communications	62	10		3		3	61	6	NA	NA
Community Services	59	28	58	8	60	10	58	12	NA	NA
Computer & Info. Sciences		2	64	7		1			NA	NA
General Studies		4		3		2		4	NA	NA
Education	61	43	62	37	61	36	59	13	NA	NA
Engineering	64	10	62	8				4	NA	NA
Fine & Applied Arts	62	10	64	8		1		2	NA	NA
Foreign Languages									NA	NA
Health Professions	61	112	60	194	60	136	59	20	NA	NA
Home Economics		4		2		1		1	NA	NA
Letters		2		3	63	5		1	NA	NA
Mathematics		2						1	NA	NA
Philosophy/Religion		1						1	NA	NA
Physical Sciences		2		3		1		4	NA	NA
Social Sciences	63	27	63	27	61	28	60	17	NA	NA
Trade & Industrial		4		1				1	NA	NA
No response	58	45	59	50	59	54	60	5	NA	NA

**NOTES:** ACT does not provide data for groups with a sample size less than 5. National averages are only available in aggregate and for freshmen, sophomores, and juniors.

The only average with a difference greater than 5.4 was that for African American students in 2010. However, because the sample size is extremely small (n=10) and because a national average for this group is not provided, this result should be interpreted with caution.

### Detailed Results

A Content Analysis Report was acquired from CAAP for this year, as it was the previous two years. The report provides information to better identify specific content areas in which Owens students are

strong or weak relative to a normative group of students. This detailed report is available in Appendix B.

Table 4 shows the comparisons between Owens students (Local cohort) and normative groups upon the three measurements of the critical thinking test: analysis of arguments, evaluation of arguments, and extension of arguments. These are further broken down by student performance on the test: bottom 25%, middle 50%, and top 25%.

Differences with magnitudes less than 5%, between 5% and 10%, and greater than 10% are considered negligible, moderate, and substantial, respectively.

**Table 4: Comparison of Local/Normative Groups  
(Local/Normative Differences in Percent Correct)**

Content Category	Bottom 25%			Middle 50%			Top 25%		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Analysis of Arguments	2%	2%	4%	1%	3%	4%	0%	2%	2%
Evaluation of Arguments	3%	3%	0%	8%	0%	3%	3%	-2%	0%
Extension of Arguments	5%	0%	-5%	4%	3%	-5%	-2%	1%	-3%

There were no meaningful differences noted among any of these measurements and subgroups for the 2013 testing period. Compared with the last testing period in Spring 2012, moderate differences were noted in a few categories. Among those in the bottom 25%, 2013 scores were moderately lower for evaluation and extension of arguments than the national norm. For the middle 50% group, scores for evaluation of arguments were moderately higher in the 2013 test but lower for Extension of Arguments vs. the national norm. For the top 25%, 2013 scores showed a slight improvement in Evaluation of Argument but a relative decrease in scores for Extension of Argument.

### **Conclusions, Limitations, & Questions for Future Research**

Overall, results indicate that:

- Owens students do not differ meaningfully on their critical thinking skills from a national sample of students at other two-year public institutions.
- In the detailed analysis, only negligible differences are noted between Owens participants and the national norm for the 2013 testing period.
- Although the overall scores showed negligible change from 2011-2013, there was no real change in students' critical thinking skills from 2011.
- There are no meaningful differences in critical thinking skills among different student groups of Owens students.

However, there are several limitations to the data that should be considered in the interpretation and use of results:

- Differences in scores from the national average, from year-to-year, and between groups are statistically very small and well within the normal range. Only differences of 5 points or more are unlikely to be due to chance and are of practical significance.

- Sample sizes for various student groups are very small and national averages for different student groups are not available; therefore, data by student demographic characteristics should be interpreted very cautiously.

## Appendix A

### Sample Passage 1

Senator Favor proposed a bill in the state legislature that would allow pharmacists to prescribe medications for minor illnesses, without authorization from a physician (i.e., a "prescription"). In support of her proposal, Favor argued:

Doctors have had a monopoly on authorizing the use of prescription medicines for too long. This has caused consumers of this state to incur unnecessary expense for their minor ailments. Often, physicians will require patients with minor complaints to go through an expensive office visit before the physician will authorize the purchase of the most effective medicines available to the sick.

Consumers are tired of paying for these unnecessary visits. At a recent political rally in Johnson County, I spoke to a number of my constituents and a majority of them confirmed my belief that this burdensome, expensive, and unnecessary practice is widespread in our state. One man with whom I spoke said that his doctor required him to spend \$80 on an office visit for an uncommon skin problem which he discovered could be cured with a \$2 tube of prescription cortisone lotion.

Anyone who has had to wait in a crowded doctor's office recently will be all too familiar with the "routine": after an hour in the lobby and a half-hour in the examining room, a physician rushes in, takes a quick look at you, glances at your chart and writes out a prescription. To keep up with the dizzying pace of "health care," physicians rely more and more upon prescriptions, and less and less upon careful examination, inquiry, and bedside manner.

Physicians make too much money for the services they render. If "fast food" health care is all we are offered, we might as well get it at a good price. This bill, if passed into law, would greatly decrease unnecessary medical expenses and provide relief to the sick: people who need all the help they can get in these trying economic times. I urge you to vote for this bill.

After Senator Favor's speech, Senator Counter stood to present an opposing position, stating:

Senator Favor does a great injustice to the physicians of this state in generalizing from her own health care experiences. If physicians' offices are crowded, they are crowded for reasons that are different from those suggested by Senator Favor. With high operating costs, difficulties in collecting medical bills, and exponential increases in the costs of malpractice insurance, physicians are lucky to keep their heads above water. In order to do so, they must make their practices more efficient, relying upon nurses and laboratories to do some of the patient screening.

No one disputes the fact that medical expenses are soaring. But, there are issues at stake which are more important than money—we must consider the quality of health care. Pharmacists are not trained to diagnose illnesses. Incorrect diagnoses by pharmacists could lead to extended illness or even death for an innocent customer. If we permit such diagnoses, we will be personally responsible for those illnesses and deaths.

Furthermore, since pharmacies make most of their money by selling prescription drugs, it would be unwise to allow pharmacists to prescribe. A sick person who has not seen a physician might go into a drugstore for aspirin and come out with narcotics!

Finally, with the skyrocketing cost of insurance, it would not be profitable for pharmacists to open themselves up to malpractice suits for mis-prescribing drugs. It is difficult enough for physicians with established practices to make it; few pharmacists would be willing to take on this financial risk. I recommend that you vote against this bill.

### Sample Items for Passage 1

1. Favor's "unofficial poll" of her constituents at the Johnson County political rally would be more persuasive as evidence for her contentions if the group of people to whom she spoke had:



- I. been randomly selected.
  - II. represented a broad spectrum of the population: young and old, white and non-white, male and female, etc.
  - III. not included an unusually large number of pharmacists.
- A. I only  
B. II only  
C. III only  
D. I, II, and III
2. In her example of the man who paid \$80 for an office visit to treat an uncommon skin problem, Favor seems to assume, but probably should not, that:
- A. the man would have discovered this cure without the doctor's diagnosis.
  - B. two dollars is the average price of the cortisone lotion.
  - C. eighty dollars is the average price for an office visit of this kind.
  - D. cortisone lotion is effective on all rashes.
3. Counter's concern that a sick person who has not seen a physician might go into a drugstore for aspirin and come out with narcotics is probably unfounded because:
- A. sick persons often send others to get their drugs.
  - B. narcotics are not normally prescribed for "minor ailments."
  - C. most people do not buy aspirin at the drugstore.
  - D. most people who need narcotics go to a physician to get them.
4. It is obvious from Favor's speech that she believes which of the following?
- A. Most prescriptions are unnecessary.
  - B. Senator Counter will oppose the bill.
  - C. If the bill is passed into law, it will greatly reduce the cost of all medical treatment.
  - D. If the bill is passed, the average costs for treatment of minor ailments would be reduced significantly.
5. It is clear from Senator Counter's speech that he believes:
- A. physicians are not having difficult economic times.
  - B. Favor's description of the crowded physician's office is not completely inaccurate.
  - C. the cost of malpractice insurance is not growing at an accelerated pace.
  - D. the quality of health care will not diminish if pharmacists are allowed to prescribe drugs.

**Appendix B**  
**CAAP Content Analysis Report**  
**Spring 2012**