

# 2013-2014 Institutional Assessment of Critical Thinking

Report submitted by Jim Taylor, Professor of Philosophy and Lead Assessment Specialist for Critical Thinking in 2013-2014

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## I. Critical Thinking Assessment: Overview, Contexts, Data Collection, Limitations

**Overview.** Many educators believe that critical thinking skills are the most important outcome of higher education. Westmont's commitment to critical thinking is represented by our institutional learning outcome that *Westmont graduates will accurately evaluate the strength of evidence in support of a claim*. Our institutional assessment efforts in the 2013-2014 academic year were devoted to investigating how well our students are doing in the area of critical thinking.

**Contexts.** The members of the assessment team that engaged in this investigation were Jim Taylor (Philosophy), Lead Assessment Specialist; Steve Contakes (Chemistry), *Assessment Consultant in Natural & Behavioral Sciences*; Angela D'Amour (Student Life), *Assessment Consultant in Student Life*; Rick Pointer (History), *Assessment Consultant from the General Education Committee*; Randy VanderMey (English), *Assessment Consultant in the Humanities*; and Jane Wilson (Liberal Studies), *Assessment Consultant in Social Sciences*. Tatiana Nazarenko (Administration), *Dean of Curriculum & Educational Effectiveness* oversaw, organized, and supported our efforts throughout.

The assessment team had a brainstorming meeting in October 2013. We agreed that we wanted to find an assessment instrument that would test students on their ability to employ higher-order critical thinking skills in thinking about real world problems (rather than one that requires less rigorous thinking about relatively artificial problems of the sort contained in some critical thinking textbooks). We also acknowledged that there is more to critical thinking than the skill set required to meet our institutional critical thinking student learning outcome (to accurately evaluate the strength of evidence in support of a claim). So we left open the possibility of employing an assessment tool that would test students on a wider range of skills.

Five of us (Taylor, Contakes, Pointer, VanderMey, and Nazarenko) attended a Critical Thinking Assessment Test (CAT) "Train the Trainers" workshop in Washington, DC in November 2013 led by a team from the Center for Assessment & Improvement of Learning at Tennessee Tech University. At the workshop we learned how to score the 15-question, short answer CAT, which takes students about an hour to complete and which requires them to engage in relatively high-level real world critical thinking and problem solving. It also requires them to be able to exercise creativity and to communicate their answers clearly, concretely, and concisely. All five of us left the workshop quite impressed with this instrument and ready to recommend it for our use to the rest of the assessment team.

At the end of November, the assessment team met to debrief the CAT workshop and decided to administer the CAT to a sample of graduating seniors during the spring semester. We chose the CAT because it focuses on a number of identifiable higher-order critical thinking skills of the sort contained in Bloom's classic taxonomy of cognitive skills, involves thinking about real world problems, requires short essays as answers to most questions (thus revealing students' underlying thought processes), is scored in a guided scoring session by Westmont faculty (thus providing us with professional development benefits), has been widely used for over 20 years (by over 200 institutions of higher learning on their campuses and in over 40 NSF projects), is valid and reliable, provides a basis for comparison to national norms, and is relatively inexpensive.

In the process of choosing to use the CAT, we compared it to two other critical thinking assessment instruments, which we decided were not as suitable for our purposes. One of these alternatives is the Collegiate Learning Assessment (the CLA). Westmont administered the CLA to first year students and seniors in the 2006-2007, 2008-2009, and 2010-2011 academic years, but Dean Nazarenko and the Academic Senate found it to be of limited value at the time. The CLA requires students to write an essay that demonstrates thinking that is high on both the rigor and relevance scales. So it satisfies one of the criteria the team had identified at our October meeting. But it is much more expensive than the CAT is, and since it is graded by the Council for Aid in Education (CAE) staff, it has less professional development benefit than the CAT does, which is scored by faculty at the institution that administers it. Additionally, the CLA reports do not provide sufficient information about students' specific strengths and weakness in the critical thinking skills area. Some of our faculty members have attended workshops that equipped them to use CLA performance tasks in the classroom. But though some of us may continue to benefit from the resources we received at these workshops, we decided not to use the CLA for institutional assessment purposes.

The other instrument we decided against using is the California Critical Thinking Skills Test (the CCTST) and its companion instrument, the California Critical Thinking Disposition Inventory (the CCTDI). The first of these tools uses a multiple-choice format and the second employs a Likert-type scale to measure student agreement and disagreement "with statements expressing familiar opinions, beliefs, values, expectations and perceptions that relate to the reflective formation of reasoned judgments" ([Insight Assessment website](#)). We decided the short-answer format of the CAT would give us a better picture of our students' thinking processes – especially since we would be scoring the CATs ourselves. We also decided that the questions on the CCTST are relatively artificial (not high in relevance and real world application) and are focused on an unduly limited set of critical thinking skills. We also deemed that the questions on the CCTDI are too easy for students to "cheat" on, since it is easy for test-takers to discern what responses would indicate that one is highly disposed to think critically, and students may be motivated to represent themselves as being more highly disposed to think critically than they actually are. Though we decided not to use these instruments as our main assessment tools, they were administered on a limited basis to the first-year students enrolled in the coupled PHI-006 and HIS-10 courses, as well as to

seniors in the ART-193, BIO-195, and ED-195 senior seminars. These test administrations took place in September of 2013 (just before our team was formed) and to a proper subset of the same first-year students again in December. The CCTST overall national mean for four-year undergraduate students is 75.71 (out of 100), a score that falls into the “moderate” category. Our seniors had an overall mean of 79.7, which falls into the “strong” category. Our first year students had an overall mean of 77.3 in September and 78.1 in December (both in the “moderate” category). So all of our students did better than the national average, the seniors did better than the first year students, and the first year students’ December overall mean score was somewhat higher than their September overall mean score. But fewer first year students took the second test (16, down from 25), and whereas in the second test results the mean scores for some skill areas increased, the mean scores for other skill areas decreased. So it is difficult to determine whether any learning that took place in PHI-006 or HIS-10 played a role in the second test results and if it did, whether any particular learning activities contributed to any changes in scores. One thing that is clear is that the instructors of these courses did not deliberately focus on any of the skill areas covered by the CCTST (analysis, interpretation, inference, evaluation, explanation, induction, and deduction) in such a way as to equip them to perform well on the sorts of questions contained in the test.

After administering the CAT to a number of seniors early in the spring semester, the assessment team met in April to discuss the CAT administrations and to plan the April 24<sup>th</sup> Faculty Forum on Critical Thinking. At the forum, Taylor summarized what the assessment team had done during the year and explained how the team and some additional faculty and administrators would score the tests in June. Then he briefly introduced the 15 specific critical thinking skills covered by the CAT (see [Appendix A](#)). and encouraged the faculty in attendance to discuss their answers to the following questions that refer to these 15 skills:

1. Which of these 15 skills do our students need to improve?
2. In what courses should we focus on these skills?
3. What discipline-specific CT skills do your majors need to improve?
4. In which of your major courses do you teach (or should you be teaching) these skills?
5. What assignments would facilitate student development of one of these skills?
6. What success (or failure) stories do you have about teaching critical thinking skills?

These and similar questions can guide our faculty conversation about what to do going forward in light of the results of the spring 2014 CAT administration (see below).

**Data Collection.** We administered the CAT to over 90 seniors in senior seminar classes throughout the spring semester. These senior seminar classes were from the following departments: Computer Science, Economics & Business, Philosophy, Psychology, Religious Studies, and Sociology. As a result, we were able to test students in six different majors with two majors from each of our three academic divisions (Humanities, Natural & Behavioral Sciences, and Social Sciences).

On June 16<sup>th</sup> the assessment team and some additional faculty and administrators spent the day scoring 72 of the 90+ CATs taken by Westmont students during the spring semester. The 72 students whose CATs we scored comprise nearly 20% of the 2014 Westmont graduating senior class of 367. Twelve Westmont faculty, librarians, and administrators participated in the scoring session. Those involved included Jim Taylor, Rick Pointer, Randy VanderMey, Jane Wilson, Steve Contakes, Angela D'Amour, Rachel Winslow, Molly Riley, Tatiana Nazarenko, Mary Logue, Edd Noell, and Wayne Iba. We followed the scoring procedure that the five of us who had attended the CAT workshop in Washington, DC (Taylor, Pointer, VanderMey, Contakes, and Nazarenko) had learned. Taylor and Pointer led the scoring session and the other ten scored an average of seven exams each (as recommended by the Center for Assessment & Improvement of Learning staff). We scored the 15 questions one at a time, and after going over the official CAT scoring instructions for each question, we discussed how we would score sample answers to those questions in order to try to calibrate our judgments. We finished our scoring of the 72 tests with enough time left over to discuss our observations about scoring the tests and about our students' performance on the test. A summary of that conversation can be found in [Appendix B](#).

The scored CATs were sent to the Center for Assessment & Improvement of Learning at Tennessee Tech University for an accuracy check and for the preparation of Westmont's CAT Institutional Report. The Center sent us an initial, comprehensive Institutional Report (see [Appendix C](#)) before they performed the accuracy check. The accuracy report we received indicated that some of our scorers had been overly generous in their assignment of points on three of the fifteen questions (see [Appendix D](#)). Our Institutional Report was adjusted to account for these deviations (see [Appendix E](#)). At our request, the Center also prepared a document for us, based on the revised Institutional Report, which indicates total CAT score by division and by department, with national comparisons (see [Appendix F](#)).

**Limitations.** This study is subject to all of the usual limitations of an assessment tool that is administered to a proper subset of a population only one time. Appropriate caution must be taken when drawing conclusions about the entire population on the basis of the performance of the sample. There is good reason to think that the sample of 72 students whose CATs we scored is relatively *random*. Since nearly all majors have a senior seminar or capstone course of some kind, and since the test was administered only to students in senior seminar or capstone courses, almost any graduating Westmont senior could have wound up being part of the sample. Moreover, since there were two majors from each division represented, the students who participated came from a wide range of disciplines. However, there were nearly twice as many students from a Social Science major (n=35) as there were from a Humanities (n=18) or Natural & Behavioral Science major (n=18), so the distribution of students across the three

divisions was not equal in number.<sup>1</sup> There is also good reason for thinking that the sample of 72 is *representative* of the entire 2014 graduating class. Using the entering SAT and ACT scores and cumulative GPAs of the students in the sample, Bill Wright, Director of Institutional Research, ran a few simple statistics and observed the following:

- Based on GPA, the sample looks representative of the senior class. The CAT sample has a GPA of 3.268 and the Class of 2014 has a GPA of 3.277;
- There is only a very weak correlation between GPA and CAT scores;
- The highest correlation found was between CAT scores and the SAT Verbal scores;
- The correlation between CAT score and SAT Math scores is weak.

All of these results are summarized at the bottom of the spreadsheet in [Appendix G](#).

## II. What We Learned

A look at [Appendix F](#) will show that the overall Westmont average total CAT score (adjusted for accuracy) is 20.37 (out of a possible 38). Given the average entering SAT score of the Westmont students who took the CAT (1199), the Westmont average CAT score is 93.4% of the average national CAT score achieved by upper division students with the same SAT score. So the Westmont students who took the CAT did collectively slightly less well than their same-SAT national peers did collectively on the CAT.

But though our students did somewhat less well overall than the national norm for students with the same SAT score, they did generally as well as or better than all students who have taken the CAT, regardless of SAT score. The first page of our corrected CAT Institutional Report (see [Appendix E](#)) entitled, "Upper Division CAT Means Comparison Report," which summarizes the results for all students, shows that the "effect size" (mean difference divided by pooled group standard deviation) is higher by at least .30 on five of the questions (#s 1, 2, 5, 6, & 8), roughly the same (between +.27 and -.27) on nine of the questions (#s 3, 4, 9-15), and .28 lower on one question (#7). What that means is that, overall, our students performed as well as or better than the national average on each CAT question except one. See [Appendix A](#) for a list of the specific skills assessed by each question and [Appendix J](#) for a graph that shows the effect size (difference between the Westmont and national mean scores divided by pooled standard deviation) for each question. Kevin Harris, Associate Director of the Center for Assessment & Improvement of Learning, advised us to focus on the skills assessed by the questions on which our students performed worse than the national average or no better than the national average. Those skills are as follows (starting with

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<sup>1</sup> The number of students mentioned in this sentence (35+18+18) adds up to 71 rather than 72 since one of the tests we scored was eliminated before the report was generated due to its being insufficiently complete.

the skill that needs the most improvement relative to the national average and then continuing in the order of increasingly better scores relative to the national average as indicated by the parenthetical decimal after each skill):

- Q7 – Identify additional information needed to evaluate a hypothesis. (-.28)
- Q11 – Use and apply relevant information to evaluate a problem. (-.17)
- Q10 – Separate relevant from irrelevant information when solving a real-world problem. (-.11)
- Q13 – Identify suitable solutions for a real-world problem using relevant information. (-.04)
- Q4 – Identify additional information needed to evaluate a hypothesis. (No difference)
- Q3 – Provide alternative explanations for a pattern of results that has many possible causes. (+.01)
- Q15 – Explain how changes in a real-world problem situation might affect the solution. (+.03)
- Q9 – Provide relevant alternative interpretations for a specific set of results. (+.14)
- Q14 – Identify and explain the best solution for a real-world problem using relevant information. (+.16)
- Q12 – Use basic mathematical skills to help solve a real-world problem. (+.27)

### **III. Recommendations**

Going forward, Kevin Harris recommended that, now that we have an idea where our students are as they are exiting the college, we should identify some courses in which to focus on the skills we've chosen to target and then use the CAT to do pre-testing and post-testing in those courses to see whether our teaching of those skills is effective. In addition, he said that we could invite faculty members to consider which of the skills we target they would like to provide instruction for in one of their classes (again, using pre- and post-tests). He told me that I should expect some faculty to recommend that we test incoming freshmen to get a benchmark to compare with our senior class results. But he said he didn't think that would be necessary or even helpful. He said he thought it would be better for us to focus on using the CAT at the individual course level (using a pre-test and post-test design) going forward.

In light of Harris's recommendations, the Critical Thinking Assessment Team urges the Academic Senate to (1) select 3-4 critical thinking skills from the list of those it would be good for our students to improve (the Team recommends #s 7, 10, 11, and 13 since they are the skills the test results suggest our students need to improve most); (2) identify a course or courses in which focused instruction could be given for the improvement of these skills (the Team recommends a GE course from each of the three divisions such as PHI-012, CHM-005, and SOC-001); (3) secure the faculty members who are willing to teach those skills in those courses; (4) provide those faculty members with the resources they need to implement this skill instruction effectively; and (5) arrange with the Center for Assessment & Improvement of Learning to have an adequate number of CATs for pre-tests and post-tests in these selected courses. The documents entitled, "Effective Practices for Improving Students' Critical Thinking and

Problem Solving” (see [Appendix H](#)) and “Effectively Using the CAT for Assessment” (see [Appendix I](#)) in the CAT Training Manual (version 8) will be especially useful as resources for the faculty who agree to teach a class that targets specific CAT critical thinking skills. The Team also recommends that the Academic Senate (6) consider changing the Critical Thinking ILO to make it more inclusive of a broader range of critical thinking skills.

Since the focus of our critical thinking assessment was on the entire institution rather than on individual academic divisions and departments, this report does not include a discussion of CAT results by division and department. But those results are available in [Appendix F](#) (which compares adjusted CAT scores by division and department to the average national CAT scores of upper division students with the same entering SAT scores irrespective of discipline) and [Appendix K](#) and [Appendix L](#) (which show in graph form the Westmont overall mean scores as a percentage of the National overall mean score by division and department respectively). The charts and graphs in those appendices show that some of our divisions and departments did better than the national average CAT score received by students with the same entering SAT scores as the average SAT scores of those divisions and departments and some of them did worse than the national average CAT score received by students with the same entering SAT scores as the average SAT scores of those divisions and departments. Also, the revised CAT Institutional Report in [Appendix E](#) contains upper division CAT means comparison reports by division and by department that indicate how the students in each division and department did *on each question* as compared to the national average for each question. Given these resources, individual departments are encouraged to make use of the relevant divisional and departmental results in order to select specific critical thinking skills to target for special instruction for departmental purposes. Departments can administer pre-tests and post-tests to their own majors with an eye toward specific skills they have chosen to emphasize in one or more of their classes depending on the results indicated in their departmental (for the six departments whose seniors took the test) or divisional (for the rest of the departments) results.

Another of Harris’s recommendations for individual departments is to (1) select the skills tested by the CAT that are especially important in their discipline and then (2) develop discipline-specific analogs to the CAT questions that test students on these skills. Though students’ responses to these discipline-specific analogue questions will not be assessable by means of the standard CAT scoring process, departments can formulate their own rubrics as tools to evaluate the tests they construct out of their discipline-specific questions.

#### **IV. Appendices**

- [Appendix A: Critical Thinking Skills Assessed by CAT Question](#)
- [Appendix B: Summary of CAT Scoring Debriefing Session](#)
- [Appendix C: Initial, Comprehensive CAT Institutional Report](#)
- [Appendix D: CAT Scoring Accuracy Report](#)

- [Appendix E: CAT Institutional Report – Data Transformed for Accuracy](#)
- [Appendix F: Total CAT Score by Division & Department with National Comparison](#)
- [Appendix G: CAT Sample SATs & GPAs with the Results of Bill Wright’s Analysis](#)
- [Appendix H: Effective Practices for Improving Student’s Critical Thinking and Problem Solving Skills](#)
- [Appendix I: Effectively Using the CAT for Assessment](#)
- [Appendix J: Difference between Westmont Mean & National Mean by Question \(Graph\)](#)
- [Appendix K: Percentage of National Overall Mean Score by Division \(Graph\)](#)
- [Appendix L: Percentage of National Overall Mean Score by Department \(Graph\)](#)

## **Appendix A: Critical Thinking Skills Assessed by CAT Question**

- Q1 – Summarize the pattern of results in a graph without making inappropriate inferences.
- Q2 – Evaluate how strongly correlational-type data supports a hypothesis.
- Q3 – Provide alternative explanations for a pattern of results that has many possible causes.
- Q4 – Identify additional information needed to evaluate a hypothesis.
- Q5 – Evaluate whether spurious information strongly supports a hypothesis.
- Q6 – Provide alternative explanations for spurious associations.
- Q7 – Identify additional information needed to evaluate a hypothesis.
- Q8 – Determine whether an invited inference is supported by specific information.
- Q9 – Provide relevant alternative interpretations for a specific set of results.
- Q10 – Separate relevant from irrelevant information when solving a real-world problem.
- Q11 – Use and apply relevant information to evaluate a problem.
- Q12 – Use basic mathematical skills to help solve a real-world problem.
- Q13 – Identify suitable solutions for a real-world problem using relevant information.
- Q14 – Identify and explain the best solution for a real-world problem using relevant information.
- Q15 – Explain how changes in a real-world problem situation might affect the solution.

## **Appendix B: Summary of CAT Scoring Debriefing Session**

### Suggestions:

- Identify which of the 15 critical thinking skills are most in need of improvement.
- Identify which skills should be taught at the GE (perhaps lower division) level.
- Identify which of the 15 skills are essential for each discipline.

### *Assignments*

- Develop open-ended assignments (upper-division classes).
- Make values embedded in assignments explicit; ask students to identify values at work within the problems.
- Promote deep level reading and thinking about problems/questions similar to those contained in the test.
- Provide information overload by giving students more information than they need so that they can determine which information is relevant and which is irrelevant.
  - Add distractors to assignments and tests.
  - Develop assignments that have multiple answers instead of single solutions.
- Provide a safe environment to fail, and discuss what students learned from failure that might help them succeed in real world settings.

### *Rubrics*

- Provide a rubric early on or engage students in creating the rubric so that students know what they are shooting for.
- Provide samples of good and outstanding products for students.

### *Tests*

- Conduct a diagnostic assessment at the beginning of a term in order to see the progress better.
- Write clear specific prompts.
- Ask students to explain reasoning behind an answer.

### Questions:

- What kinds of assignments are more likely to provide opportunities for students to develop critical thinking skills?
  - Experts recommend these generic critical thinking training methods:
    - service learning
    - debates
    - simulations
    - case studies
    - real world problem solving tasks
    - involving students in real research
  - Where and how can we incorporate methods that develop critical thinking skills?
    - Research suggests that the CT skills should be intentionally taught.
    - GE courses?
    - Internships?
    - Capstones and senior seminars?
    - Co-curricular activities
    - *Concern:* Some courses cover so much information that it's challenging to incorporate critical thinking tasks that take additional time (e.g., science).

**Appendix C: Initial, Comprehensive CAT Institutional Report**



Critical thinking Assessment Test

# INSTITUTIONAL REPORT

CENTER FOR ASSESSMENT & IMPROVEMENT OF LEARNING

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# The CAT Instrument

The CAT instrument is a unique tool designed to assess and promote the improvement of critical thinking and real-world problem solving skills. The instrument is the product of extensive development, testing, and refinement with a broad range of institutions, faculty, and students across the country. The National Science Foundation has provided support for many of these activities.

The CAT instrument is designed to assess a broad range of skills that faculty across the country feel are important components of critical thinking and real world problem solving. The test was designed to be interesting and engaging for students. All of the questions are derived from real world situations. Most of the questions require short answer essay responses and a detailed scoring guide helps ensure good scoring reliability.

The CAT instrument is scored by the institution's own faculty using the detailed scoring guide. Training is provided to prepare institutions for this activity. During the scoring process faculty are able to see their students' weaknesses and understand areas that need improvement. Faculty are encouraged to use the CAT instrument as a model for developing authentic assessments and learning activities in their own discipline that improve students' critical thinking and real-world problem solving skills. These features help close the loop in assessment and quality improvement.

## Effectively Using the CAT Instrument

### Assessment Models/Designs

The CAT instrument is adaptable to a variety of assessment goals and designs. We discuss these assessment goals and some of the more frequently used models below.

The CAT instrument can be used for a variety of assessment goals.

- Evaluate effects of college education
- Evaluate effects of a program of study
- Evaluate effects of a course
- Evaluate effects of informal learning experiences

There are a variety of assessment designs that can be employed with the CAT instrument. The CAT instrument is very adaptable to various research/assessment designs because the test is very sensitive to treatment effects and because the test can be used with all levels of college students without floor effects (students obtaining the minimum score possible) or ceiling effects (students obtaining the maximum score possible). These include:

- Pre-test/Post-test designs
  - Test students at the beginning and end of course or experience (with or without a control group).
  - Test students when they are freshmen and then again when they are seniors (true value added).
- Cross-sectional studies
  - Compare freshmen to seniors (typical value-added analysis).
- Evaluate changes in program outcomes over time
  - Compare scores on the CAT after program improvements to established baseline scores that precede program changes.
  - Compare scores on the CAT to national norms over time and look for improvements.

- Evaluate changes in programs or courses by comparison to a control group.
  - Compare scores on the CAT for students who have had special courses/experiences to those for a control group who have not had the special courses/experiences.

## **Reducing Costs with Appropriate Sampling**

We advocate a variety of practices to reduce the cost of testing without compromising the accuracy of the assessment. For example, various sampling strategies can be used to reduce the need to test all students. If that is not possible, then only a sample of the tests given might be scored. We discuss two accepted methods of sampling to ensure valid and representative results. However, we realize that the sampling techniques are not feasible at all institutions. Center staff will be happy to discuss these and other alternatives in more detail.

1. **Random sampling:** A subset of the student population of interest is randomly selected for testing/scoring. The larger the sample, the more confidence there is that the sample is representative of the population of interest. In a random sample, all students have an equal chance of being selected. This is not to be confused with a convenience sample that includes only those students who volunteer to take the test.
2. **Stratified random sampling:** The population is divided into subgroups (e.g., Arts & Sciences, Engineering, Education, etc.). A random sample of students within each subgroup is then selected. The number of students in each randomly sampled subgroup should be proportional to that group's proportion of the population. Stratification can help ensure a more representative sample with smaller sample sizes.

## **Sampling after Test Administration**

In many institutions it is not possible to administer the test to a random sample of students within a class. In these situations, we recommend administering the test to the larger group and then randomly sampling tests from that group to score during the faculty scoring session. This procedure will allow institutions to achieve a more representative sample without greatly increasing the faculty time needed to score tests. We recommend having a minimum of 10 – 15 tests or pairs of tests per group (e.g., class, program of study, etc.).

## **Scoring Accuracy Checks**

At various times during the year, we conduct analyses of scoring accuracy and provide feedback about the accuracy of scoring and, if necessary, specific recommendations for improving the accuracy of scoring on a question-by-question basis. These reports are sent separately from the institutional summary report.

## Example Assessment Designs to Use with the CAT Instrument

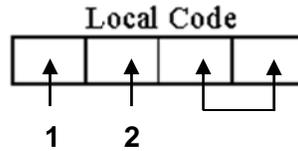
(These designs can easily be coded in the Local Code Field on the CAT Instrument)

Objective	Model/Design	Sampling Procedure	Sampling Before Scoring	Advantages/ Disadvantages
<i>Find Courses or Programs of Study that Improve Students' Critical Thinking</i>	<b>Pre-test vs. Post-test</b> In selected courses or programs of study  (matched students)	Administer to all students at the beginning and end of certain targeted courses or experiences	Randomly sample pairs of tests to score from each course or experience. (minimum of 10 matched pairs of tests per class)	A powerful and efficient design to evaluate specific courses and experiences (student IDs must match).
	(students not matched)		(min. of 15 pretests and 15 post-tests per class)	Less efficient & less powerful than above
	<b>Pre-test vs. Post-test With Control Group</b> In selected courses or programs of study  (matched students)	Administer to all students at the beginning and end of certain targeted courses or experiences	Randomly sample pairs of tests to score from each course or experience. (minimum of 10 matched pairs of tests per class)	A powerful design to evaluate treatment effects relative to a control.
	(students not matched)		(min. of 15 pretests and 15 post-tests per class)	Less efficient & less powerful than above
	<b>Treatment vs. Control</b>	Administer to all students at the end of certain targeted courses or experiences	Randomly sample tests that will be scored after administering to a larger sample	Might be difficult to establish equivalence of treatment & control conditions.
	<i>How much is the institution or program of study improving students' critical thinking</i>	<b>Freshmen vs. Upperclassmen</b> (value added) <b>Cross-sectional study</b> (must equate groups)	Administer to a random sample of freshmen and seniors every year	Randomly sample tests that will be scored after administering to a larger sample
<i>Is the Institution making progress in improving students' critical thinking</i>	<b>Cross Sectional Study</b> of Seniors over time (with or without National Norm Comparison)	Administer to a random sample of seniors (or all seniors) every year	Randomly sample tests that will be scored after administering to a larger sample	Would be necessary to establish the equivalence of samples over time.

# Using the Local Code Fields to Identify Assessment Design

A local code field with 4 digits appears on the back of each test booklet. You should use this area to code subgroups in your population so that the data can be easily analyzed.

## Recommended Use of Local Code



**Column 1:** Use to indicate the **Type of Design** for data included in the report.

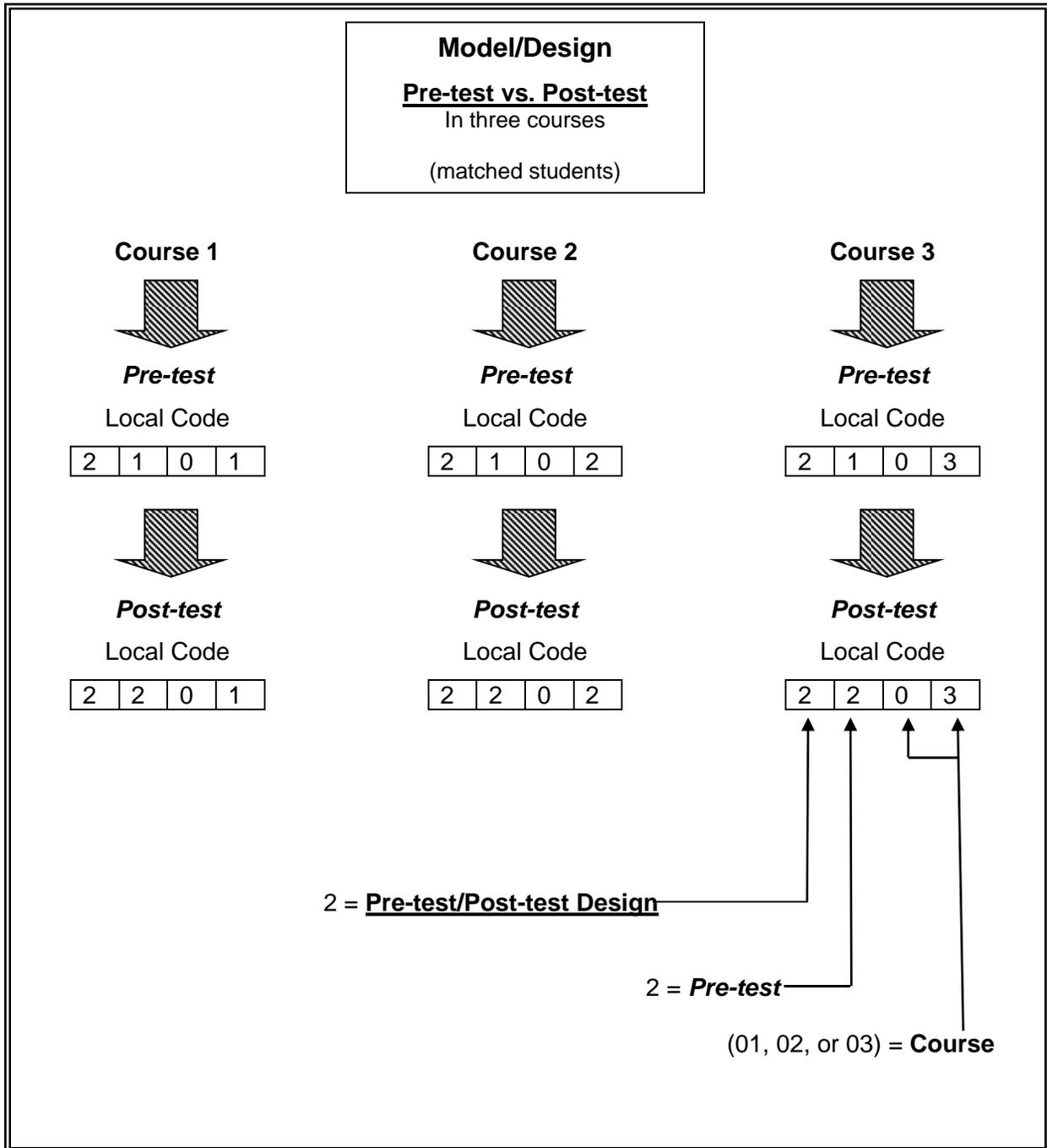
**Column 2:** Use to indicate the student's specific **Treatment Condition** in the design.

**Column 3:** Use to indicate the particular class that was being tested **if a breakdown by class is desired**.

Column 1	Column 2	Column 3 & 4
0 (or blank) = No Breakdown	0 (or blank) = No Breakdown	0 (or blank) = No Breakdown  1 – 99 = code for each course or section tested if scores are to be compared by class
1 = Breakdown only by course	1 = Breakdown only by course	
2 = <b>Pretest/Post-test Design Matched Students</b> (identical ID #'s are used)	1 = Pretest 2 = Posttest	
3 = <b>Pretest/Post-test Design Not Matched Students</b>	1 = Pretest 2 = Posttest	
4 = Treatment vs. Control (single post-test used)	0 = Control 1 = Treatment	
5 = Lower Division vs. Upper Division Students	1 = Lower Division 2 = Upper Division	
6 = <b>Pretest/Post-test Design with Control Group Matched Students</b> (identical ID #'s are used)	0 = Control Pretest 1 = Control Post-test 2 = Treatment Pretest 3 = Treatment Post-test	
7 = <b>Pretest/Post-test Design with Control Group Not Matched Students</b>	0 = Control Pretest 1 = Control Post-test 2 = Treatment Pretest 3 = Treatment Post-test	

We can easily generate reports with breakdowns of data, if you use the coding scheme above. We encourage you to contact us and discuss your plans for developing your local code before administering the test.

## Example of How to Code Tests with Local Codes



## Correlations with Entering ACT and SAT Scores

Student scores on the CAT instrument correlate with their scores on college entrance exams like the ACT and SAT. These entrance scores can explain about 25% of the variability in student performance on the CAT instrument.

	ACT	SAT
CAT	0.501*	0.516*

\* correlations significant,  $p < .01$  (updated on 8/10/10)

We provide the following table to show how the average entering ACT/SAT score at an institution might impact upper division student performance on the CAT instrument at 4 year institutions.

### CAT National User Norms (Upper division undergraduate, 4 year institutions)

Average College Entrance Score*		Upper division
ACT (Composite)	SAT (Verbal & Quantitative)	CAT Score (Estimated)
13	620	10.79
14	680	11.93
15	740	13.07
16	780	13.83
17	830	14.78
18	870	15.54
19	910	16.30
20	950	17.06
21	990	17.82
22	1030	18.58
23	1070	19.34
24	1110	20.10
25	1140	20.67
26	1180	21.43
27	1220	22.19
28	1260	22.95
29	1300	23.71
30	1340	24.47
31	1380	25.23
32	1420	25.99
33	1470	26.94
34	1520	27.89

\*Updated 8/10/10

## Your Institutional Report and Data Disk

CAT institutional reports provide information about your students' scores on the CAT instrument with descriptive information about sample demographics, mean score, minimum and maximum score, and standard deviation. In addition, the report provides a detailed frequencies breakdown of the distribution of answers (point values) for each question together with a general description of what the question is measuring. The mean score for each question and the percent of total points attained is also included. Current information about national norms is also provided. Additional comparisons are included as specified by the use of local codes.

A data file in Excel format is provided on a CD. This file contains the following information:

- Individual student responses for all questions on the demographics page and final scores for each test question
- The file includes two spreadsheets, one sheet includes all student data, the other sheet includes only students that did not have excessive missing data. The report is based on student data that is complete.
- The file also includes additional sheets with breakdowns of CAT scores that are included in the printed report.

The CD also contains a copy of the general report and CAT material order forms. Contact Kevin Harris for more information ([kharris@tntech.edu](mailto:kharris@tntech.edu), 931-372-3886).

Variable Name	Type	Description
std_s1	Scale	Entrance Exam Score as entered by the institution
qpa	Scale	QPA as entered by the institution
testnum	Nominal	Test Booklet Number
stude1	Nominal	Student ID Number
loc-code	Nominal	Local Code as entered by institution
age	Nominal	Age
gender	Nominal	Gender (0=Male; 1=Female)
spanish	Nominal	Spanish/Hispanic/Latino (0=No; 1=Yes)
primary	Nominal	English is primary language (0=No; 1=Yes)
profi1	Nominal	Proficiency with English Language (1=Excellent; 2=Very Good; 3=Good; 4=Fair; 5=Poor)
standing	Nominal	Class Standing (1=Freshman; 2=Sophomore; 3= Junior; 4=Senior)
class	Nominal	University Standing (Undergraduate=1; Graduate=2)
white	Nominal	Race: White (0=No; 1=Yes)
black	Nominal	Race: Black or African American (0=No; 1=Yes)
amer1	Nominal	Race: American Indian or Alaska Native (0=No; 1=Yes)
asian	Nominal	Race: Asian (0=No; 1=Yes)
nativ1	Nominal	Race: Native Hawaiian or Other Pacific Islander (0=No; 1=Yes)
other1	Nominal	Race: Other (0=No; 1=Yes)
q1f – q15f	Scale	Computed Score for each question.
total	Scale	CAT total score
q1 – q15	Scale	Computed Score for each question. (Rounded)
report	Nominal	Case included in report (Y=Yes; N=No)

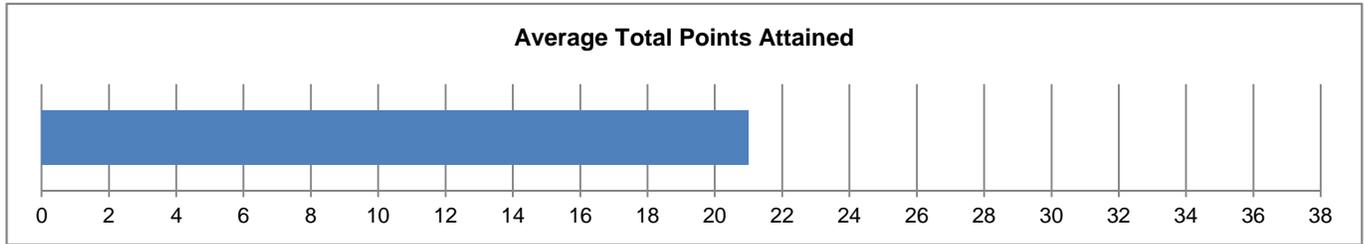
Westmont College

**CAT Institutional Report**

June 2014 - All Students

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - All Students**

	N	Min.	Max.	Mean	Std. Dev
<b>CAT Total Score</b>	71	8.00	36.00	21.00	5.33



**CAT Demographics: Descriptive Statistics for Sample**

		Freq.	Freq. %
Gender	Male	35	50.7%
	Female	34	49.3%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	2	2.8%
	Senior	69	97.2%
Class	Undergraduate	56	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	4	5.6%
	21-25 years	67	94.4%
	≥ 26 years	0	0.0%

		Freq.	Freq. %
Race**	White	61	85.9%
	Black or African American	0	0.0%
	American Indian or Alaska Native	1	1.4%
	Asian	1	1.4%
	Native Hawaiian or Other Pacific Islander	2	2.8%
	Other Race	6	8.5%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		Freq.	Freq. %
Proficiency with the English Language*	Excellent	57	80.3%
	Very Good	10	14.1%
	Good	4	5.6%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		Freq.	Freq. %
Spanish/Hispanic/Latino Ethnicity	9	12.7%	
Considered English primary language?	68	95.8%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - All Students

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	13	18.3%
		1	58	81.7%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	8	11.3%
		1	23	32.4%
		2	20	28.2%
		3	20	28.2%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	17	23.9%
		1	22	31.0%
		2	22	31.0%
		3	10	14.1%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	22	31.0%
		1	15	21.1%
		2	22	31.0%
		3	7	9.9%
		4	5	7.0%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	6	8.5%
		1	65	91.5%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	2	2.8%
		1	18	25.4%
		2	38	53.5%
		3	13	18.3%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	27	38.0%
		1	37	52.1%
		2	7	9.9%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	14	19.7%
		1	57	80.3%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	14	19.7%
		1	31	43.7%
		2	26	36.6%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	5	7.0%
		2	8	11.3%
		3	37	52.1%
		4	21	29.6%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	16	22.5%
		1	39	54.9%
		2	16	22.5%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	6	8.5%
		1	65	91.5%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	23	32.4%
		1	26	36.6%
		2	11	15.5%
		3	11	15.5%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	14	19.7%
		1	14	19.7%
		2	2	2.8%
		3	9	12.7%
		4	22	31.0%
		5	10	14.1%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	15	21.1%
		1	17	23.9%
		2	25	35.2%
		3	14	19.7%

## Institutional/Departmental Profile

Westmont College: June 2014 - All Students

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.82	82%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.73	58%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.36	45%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.41	35%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.92	92%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.87	62%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.72	36%
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	80%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	58%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.04	76%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	50%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	92%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.14	38%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.57	51%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.53	51%
CAT Total Score						21.00	55%

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - All Students

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.82	0.67	**	+0.34
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.73	1.21	***	+0.49
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.36	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.41	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.92	0.73	***	+0.50
		X	X	Q6	Provide alternative explanations for spurious associations.	1.87	1.56	**	+0.39
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.72	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	0.68	*	+0.30
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	0.93	**	+0.32
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.04	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.14	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.57	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.53	1.15	**	+0.36
<b>CAT Total Score</b>						<b>21.00</b>	<b>19.04</b>	<b>**</b>	<b>+0.34</b>

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

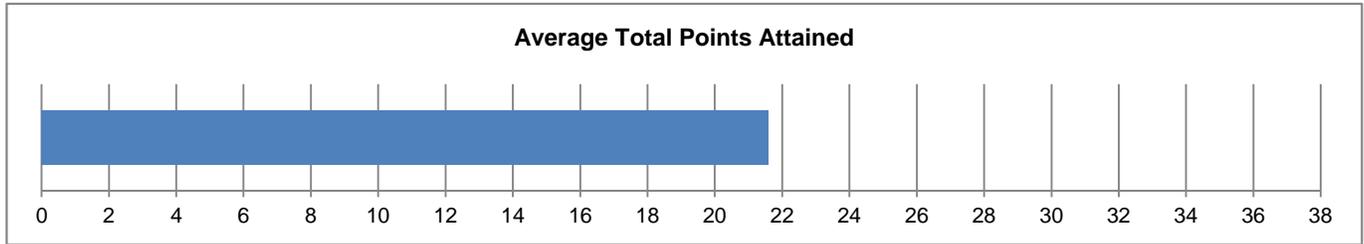
Westmont College

**CAT Institutional Report**

June 2014 - Humanities

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Humanities**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	18	12.00	28.00	21.59	4.49



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
<b>Gender</b>	<b>Male</b>	8	47.1%
	<b>Female</b>	9	52.9%
<b>Class Standing</b>	<b>Freshman</b>	0	0.0%
	<b>Sophomore</b>	0	0.0%
	<b>Junior</b>	1	5.6%
	<b>Senior</b>	17	94.4%
<b>Class</b>	<b>Undergraduate</b>	15	100.0%
	<b>Graduate</b>	0	0.0%
<b>Age</b>	<b>≤ 20 years</b>	4	22.2%
	<b>21-25 years</b>	14	77.8%
	<b>≥ 26 years</b>	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
<b>Race**</b>	<b>White</b>	16	88.9%
	<b>Black or African American</b>	0	0.0%
	<b>American Indian or Alaska Native</b>	0	0.0%
	<b>Asian</b>	0	0.0%
	<b>Native Hawaiian or Other Pacific Islander</b>	1	5.6%
	<b>Other Race</b>	1	5.6%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
<b>Proficiency with the English Language*</b>	<b>Excellent</b>	18	100.0%
	<b>Very Good</b>	0	0.0%
	<b>Good</b>	0	0.0%
	<b>Fair</b>	0	0.0%
	<b>Poor</b>	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
<b>Spanish/Hispanic/Latino Ethnicity</b>	1	5.6%	
<b>Considered English primary language?</b>	18	100.0%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Humanities

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	3	16.7%
		1	15	83.3%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	1	5.6%
		1	5	27.8%
		2	7	38.9%
		3	5	27.8%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	2	11.1%
		1	7	38.9%
		2	6	33.3%
		3	3	16.7%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	7	38.9%
		1	3	16.7%
		2	4	22.2%
		3	3	16.7%
		4	1	5.6%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	0	0.0%
		1	18	100.0%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	2	11.1%
		1	2	11.1%
		2	9	50.0%
		3	5	27.8%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	9	50.0%
		1	9	50.0%
		2	0	0.0%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	2	11.1%
		1	16	88.9%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	4	22.2%
		1	7	38.9%
		2	7	38.9%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	0	0.0%
		2	2	11.1%
		3	8	44.4%
		4	8	44.4%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	3	16.7%
		1	11	61.1%
		2	4	22.2%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	0	0.0%
		1	18	100.0%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	4	22.2%
		1	7	38.9%
		2	2	11.1%
		3	5	27.8%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	1	5.6%
		1	5	27.8%
		2	1	5.6%
		3	4	22.2%
		4	4	22.2%
		5	3	16.7%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	9	50.0%
		1	4	22.2%
		2	3	16.7%
		3	2	11.1%

## Institutional/Departmental Profile

Westmont College: June 2014 - Humanities

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	83%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.89	63%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.56	52%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	33%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	100%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.94	65%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.50	25%
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	89%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	58%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	83%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.06	53%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	100%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	48%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.78	56%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.87	29%
<b>CAT Total Score</b>						<b>21.59</b>	<b>57%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Humanities

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.89	1.21	*	+0.66
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.56	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73	*	+0.87
		X	X	Q6	Provide alternative explanations for spurious associations.	1.94	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.50	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	0.68	*	+0.57
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.06	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.78	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.87	1.15		
CAT Total Score						21.59	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2-tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

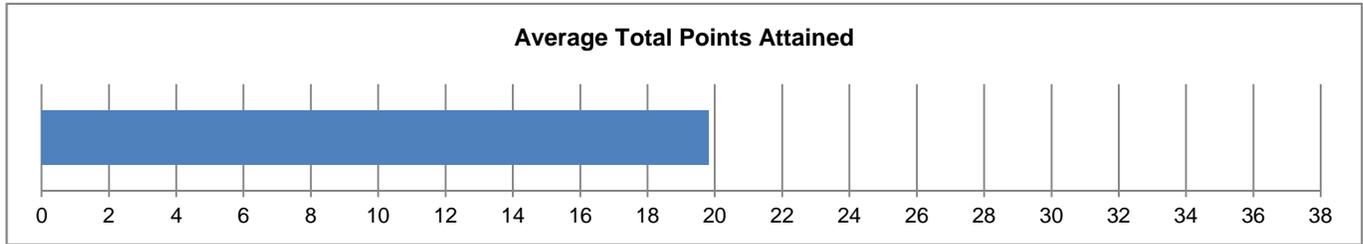
Westmont College

**CAT Institutional Report**

June 2014 - Religious Studies

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Religious Studies**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	12	12.00	25.00	19.81	3.97



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
<b>Gender</b>	<b>Male</b>	4	33.3%
	<b>Female</b>	8	66.7%
<b>Class Standing</b>	<b>Freshman</b>	0	0.0%
	<b>Sophomore</b>	0	0.0%
	<b>Junior</b>	0	0.0%
	<b>Senior</b>	12	100.0%
<b>Class</b>	<b>Undergraduate</b>	9	100.0%
	<b>Graduate</b>	0	0.0%
<b>Age</b>	<b>≤ 20 years</b>	3	25.0%
	<b>21-25 years</b>	9	75.0%
	<b>≥ 26 years</b>	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
<b>Race**</b>	<b>White</b>	10	83.3%
	<b>Black or African American</b>	0	0.0%
	<b>American Indian or Alaska Native</b>	0	0.0%
	<b>Asian</b>	0	0.0%
	<b>Native Hawaiian or Other Pacific Islander</b>	1	8.3%
	<b>Other Race</b>	1	8.3%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
<b>Proficiency with the English Language*</b>	<b>Excellent</b>	12	100.0%
	<b>Very Good</b>	0	0.0%
	<b>Good</b>	0	0.0%
	<b>Fair</b>	0	0.0%
	<b>Poor</b>	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
<b>Spanish/Hispanic/Latino Ethnicity</b>	1	8.3%	
<b>Considered English primary language?</b>	12	100.0%	

**CAT Breakdown: Frequency of Points Awarded for Each Question**

**Westmont College: June 2014 - Religious Studies**

	<b>Skill Assessed by CAT Question</b>	<b>Points Awarded</b>	<b>Freq.</b>	<b>Freq. %</b>
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	2	16.7%
		1	10	83.3%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	0	0.0%
		1	4	33.3%
		2	5	41.7%
		3	3	25.0%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	1	8.3%
		1	4	33.3%
		2	4	33.3%
		3	3	25.0%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	6	50.0%
		1	2	16.7%
		2	1	8.3%
		3	2	16.7%
		4	1	8.3%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	0	0.0%
		1	12	100.0%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	2	16.7%
		1	2	16.7%
		2	5	41.7%
		3	3	25.0%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	8	66.7%
		1	4	33.3%
		2	0	0.0%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	2	16.7%
		1	10	83.3%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	3	25.0%
		1	4	33.3%
		2	5	41.7%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	0	0.0%
		2	1	8.3%
		3	6	50.0%
		4	5	41.7%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	2	16.7%
		1	7	58.3%
		2	3	25.0%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	0	0.0%
		1	12	100.0%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	4	33.3%
		1	5	41.7%
		2	2	16.7%
		3	1	8.3%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	1	8.3%
		1	4	33.3%
		2	1	8.3%
		3	4	33.3%
		4	1	8.3%
		5	1	8.3%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	9	75.0%
		1	1	8.3%
		2	2	16.7%
		3	0	0.0%

## Institutional/Departmental Profile

Westmont College: June 2014 - Religious Studies

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	83%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.92	64%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.75	58%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.17	29%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	100%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.75	58%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.33	17%
X				Q8	Determine whether an invited inference is supported by specific information.	0.83	83%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	58%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	83%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.08	54%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	100%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.00	33%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.25	45%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.39	13%
<b>CAT Total Score</b>						<b>19.81</b>	<b>52%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Religious Studies

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.92	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.75	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.17	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.75	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.33	0.82	*	-.82
X				Q8	Determine whether an invited inference is supported by specific information.	0.83	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.08	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.00	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.25	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.39	1.15	*	-.83
CAT Total Score						19.81	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

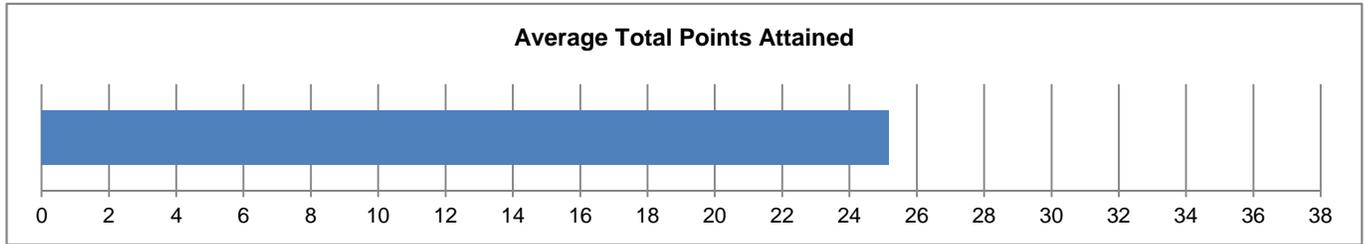
Westmont College

**CAT Institutional Report**

June 2014 - Philosophy

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Philosophy**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	6	19.00	28.00	25.17	3.31



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
Gender	Male	4	80.0%
	Female	1	20.0%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	1	16.7%
	Senior	5	83.3%
Class	Undergraduate	6	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	1	16.7%
	21-25 years	5	83.3%
	≥ 26 years	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
Race**	White	6	100.0%
	Black or African American	0	0.0%
	American Indian or Alaska Native	0	0.0%
	Asian	0	0.0%
	Native Hawaiian or Other Pacific Islander	0	0.0%
	Other Race	0	0.0%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
Proficiency with the English Language*	Excellent	6	100.0%
	Very Good	0	0.0%
	Good	0	0.0%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
Spanish/Hispanic/Latino Ethnicity	0	0.0%	
Considered English primary language?	6	100.0%	

**CAT Breakdown: Frequency of Points Awarded for Each Question**

**Westmont College: June 2014 - Philosophy**

	<b>Skill Assessed by CAT Question</b>	<b>Points Awarded</b>	<b>Freq.</b>	<b>Freq. %</b>
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	1	16.7%
		1	5	83.3%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	1	16.7%
		1	1	16.7%
		2	2	33.3%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	3	2	33.3%
		0	1	16.7%
		1	3	50.0%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	2	2	33.3%
		3	0	0.0%
		0	1	16.7%
		1	1	16.7%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	2	3	50.0%
		3	1	16.7%
		4	0	0.0%
		0	0	0.0%
<b>Q6</b>	Provide alternative explanations for spurious associations.	1	6	100.0%
		0	0	0.0%
		1	0	0.0%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	2	4	66.7%
		3	2	33.3%
		0	1	16.7%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	1	5	83.3%
		2	0	0.0%
		0	0	0.0%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	1	6	100.0%
		2	1	16.7%
		0	1	16.7%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	1	3	50.0%
		2	2	33.3%
		0	0	0.0%
		1	0	0.0%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	2	1	16.7%
		3	2	33.3%
		4	3	50.0%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	1	16.7%
		1	4	66.7%
		2	1	16.7%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	0	0.0%
		1	6	100.0%
		2	0	0.0%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	3	2	33.3%
		4	0	0.0%
		0	0	0.0%
		1	1	16.7%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	2	0	0.0%
		3	0	0.0%
		4	3	50.0%
		5	2	33.3%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	0	0.0%
		1	3	50.0%
		2	1	16.7%
		3	2	33.3%

## Institutional/Departmental Profile

Westmont College: June 2014 - Philosophy

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	83%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	61%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	39%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	42%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	100%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.33	78%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.83	42%
X				Q8	Determine whether an invited inference is supported by specific information.	1.00	100%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	58%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	83%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	50%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	100%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	2.33	78%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.83	77%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.83	61%
<b>CAT Total Score</b>						<b>25.17</b>	<b>66%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Philosophy

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.33	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.83	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	1.00	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.17	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	2.33	1.18	*	+1.12
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.83	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.83	1.15		
CAT Total Score						25.17	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

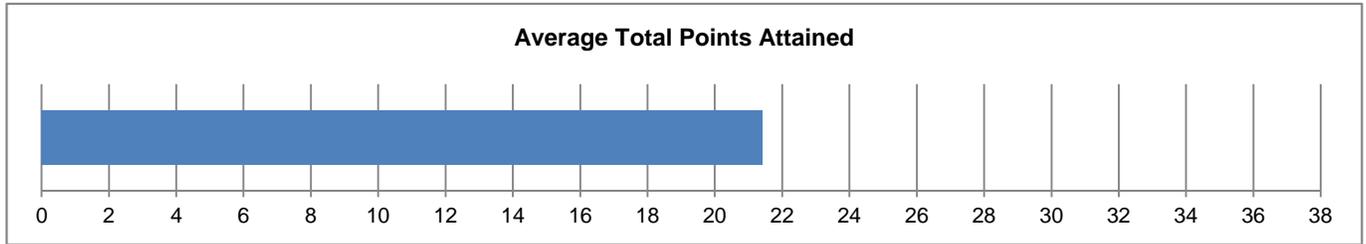
Westmont College

**CAT Institutional Report**

June 2014 - Social Sciences

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Social Sciences**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	35	11.00	30.00	21.43	4.24



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
<b>Gender</b>	<b>Male</b>	19	55.9%
	<b>Female</b>	15	44.1%
<b>Class Standing</b>	<b>Freshman</b>	0	0.0%
	<b>Sophomore</b>	0	0.0%
	<b>Junior</b>	0	0.0%
	<b>Senior</b>	35	100.0%
<b>Class</b>	<b>Undergraduate</b>	26	100.0%
	<b>Graduate</b>	0	0.0%
<b>Age</b>	<b>≤ 20 years</b>	0	0.0%
	<b>21-25 years</b>	35	100.0%
	<b>≥ 26 years</b>	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
<b>Race**</b>	<b>White</b>	28	80.0%
	<b>Black or African American</b>	0	0.0%
	<b>American Indian or Alaska Native</b>	1	2.9%
	<b>Asian</b>	1	2.9%
	<b>Native Hawaiian or Other Pacific Islander</b>	1	2.9%
	<b>Other Race</b>	4	11.4%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
<b>Proficiency with the English Language*</b>	<b>Excellent</b>	23	65.7%
	<b>Very Good</b>	8	22.9%
	<b>Good</b>	4	11.4%
	<b>Fair</b>	0	0.0%
	<b>Poor</b>	0	0.0%

\* Self-rated

	<b>Freq.</b>	<b>Freq. %</b>
<b>Spanish/Hispanic/Latino Ethnicity</b>	6	17.1%
<b>Considered English primary language?</b>	32	91.4%

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Social Sciences

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	7	20.0%
		1	28	80.0%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	7	20.0%
		1	9	25.7%
		2	10	28.6%
		3	9	25.7%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	9	25.7%
		1	9	25.7%
		2	13	37.1%
		3	4	11.4%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	8	22.9%
		1	9	25.7%
		2	13	37.1%
		3	3	8.6%
		4	2	5.7%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	5	14.3%
		1	30	85.7%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	12	34.3%
		2	20	57.1%
		3	3	8.6%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	10	28.6%
		1	23	65.7%
		2	2	5.7%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	7	20.0%
		1	28	80.0%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	8	22.9%
		1	14	40.0%
		2	13	37.1%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	3	8.6%
		2	3	8.6%
		3	22	62.9%
		4	7	20.0%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	8	22.9%
		1	18	51.4%
		2	9	25.7%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	5	14.3%
		1	30	85.7%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	10	28.6%
		1	13	37.1%
		2	7	20.0%
		3	5	14.3%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	6	17.1%
		1	4	11.4%
		2	1	2.9%
		3	3	8.6%
		4	15	42.9%
		5	6	17.1%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	2	5.7%
		1	9	25.7%
		2	16	45.7%
		3	8	22.9%

## Institutional/Departmental Profile

Westmont College: June 2014 - Social Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	80%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.60	53%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.35	45%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.49	37%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.86	86%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.74	58%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.77	39%
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	80%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.14	57%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	74%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.03	51%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.86	86%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.20	40%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.99	60%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.86	62%
<b>CAT Total Score</b>						<b>21.43</b>	<b>56%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Social Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.60	1.21	*	+0.35
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.35	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.49	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.86	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.74	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.77	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.14	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.03	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.86	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.20	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.99	2.29	*	+0.39
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.86	1.15	***	+0.74
<b>CAT Total Score</b>						<b>21.43</b>	<b>19.04</b>	<b>*</b>	<b>+0.46</b>

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

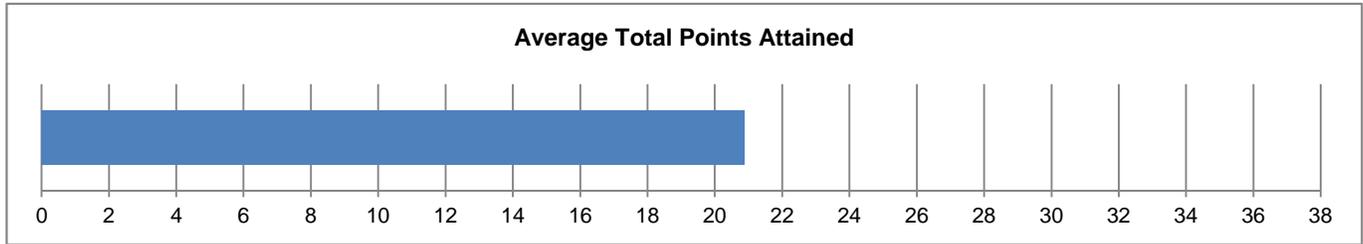
Westmont College

**CAT Institutional Report**

June 2014 - Economics & Business

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Economics & Business**

	N	Min.	Max.	Mean	Std. Dev
<b>CAT Total Score</b>	26	11.00	30.00	20.88	4.52



**CAT Demographics: Descriptive Statistics for Sample**

		Freq.	Freq. %
Gender	Male	19	76.0%
	Female	6	24.0%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	0	0.0%
	Senior	26	100.0%
Class	Undergraduate	18	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	0	0.0%
	21-25 years	26	100.0%
	≥ 26 years	0	0.0%

		Freq.	Freq. %
Race**	White	25	96.2%
	Black or African American	0	0.0%
	American Indian or Alaska Native	0	0.0%
	Asian	1	3.8%
	Native Hawaiian or Other Pacific Islander	0	0.0%
	Other Race	1	3.8%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		Freq.	Freq. %
Proficiency with the English Language*	Excellent	17	65.4%
	Very Good	5	19.2%
	Good	4	15.4%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		Freq.	Freq. %
Spanish/Hispanic/Latino Ethnicity	3	11.5%	
Considered English primary language?	24	92.3%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Economics & Business

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	6	23.1%
		1	20	76.9%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	5	19.2%
		1	6	23.1%
		2	9	34.6%
		3	6	23.1%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	7	26.9%
		1	5	19.2%
		2	11	42.3%
		3	3	11.5%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	6	23.1%
		1	7	26.9%
		2	10	38.5%
		3	2	7.7%
		4	1	3.8%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	4	15.4%
		1	22	84.6%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	8	30.8%
		2	15	57.7%
		3	3	11.5%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	8	30.8%
		1	17	65.4%
		2	1	3.8%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	6	23.1%
		1	20	76.9%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	6	23.1%
		1	11	42.3%
		2	9	34.6%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	3	11.5%
		2	1	3.8%
		3	18	69.2%
		4	4	15.4%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	8	30.8%
		1	13	50.0%
		2	5	19.2%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	2	7.7%
		1	24	92.3%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	8	30.8%
		1	10	38.5%
		2	5	19.2%
		3	3	11.5%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	5	19.2%
		1	4	15.4%
		2	1	3.8%
		3	2	7.7%
		4	10	38.5%
		5	4	15.4%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	2	7.7%
		1	6	23.1%
		2	12	46.2%
		3	6	23.1%

## Institutional/Departmental Profile

Westmont College: June 2014 - Economics & Business

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.77	77%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.62	54%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.40	47%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.42	36%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.85	85%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.81	60%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.73	37%
X				Q8	Determine whether an invited inference is supported by specific information.	0.77	77%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.12	56%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.88	72%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.88	44%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	92%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.12	37%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.76	55%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.85	62%
CAT Total Score						20.88	55%

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Economics & Business

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.77	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.62	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.40	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.42	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.85	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.81	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.73	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.77	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.12	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.88	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.88	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.12	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.76	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.85	1.15	**	+ .71
CAT Total Score						20.88	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

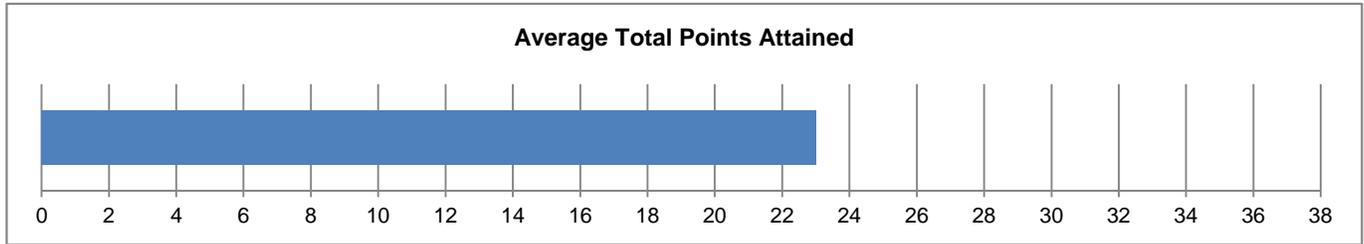
Westmont College

**CAT Institutional Report**

June 2014 - Sociology

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Sociology**

	N	Min.	Max.	Mean	Std. Dev
<b>CAT Total Score</b>	9	18.00	26.00	23.00	2.96



**CAT Demographics: Descriptive Statistics for Sample**

		Freq.	Freq. %
Gender	Male	0	0.0%
	Female	9	100.0%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	0	0.0%
	Senior	9	100.0%
Class	Undergraduate	8	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	0	0.0%
	21-25 years	9	100.0%
	≥ 26 years	0	0.0%

		Freq.	Freq. %
Race**	White	3	33.3%
	Black or African American	0	0.0%
	American Indian or Alaska Native	1	11.1%
	Asian	0	0.0%
	Native Hawaiian or Other Pacific Islander	1	11.1%
	Other Race	3	33.3%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		Freq.	Freq. %
Proficiency with the English Language*	Excellent	6	66.7%
	Very Good	3	33.3%
	Good	0	0.0%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		Freq.	Freq. %
Spanish/Hispanic/Latino Ethnicity	3	33.3%	
Considered English primary language?	8	88.9%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Sociology

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	1	11.1%
		1	8	88.9%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	2	22.2%
		1	3	33.3%
		2	1	11.1%
		3	3	33.3%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	2	22.2%
		1	4	44.4%
		2	2	22.2%
		3	1	11.1%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	2	22.2%
		1	2	22.2%
		2	3	33.3%
		3	1	11.1%
		4	1	11.1%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	1	11.1%
		1	8	88.9%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	4	44.4%
		2	5	55.6%
		3	0	0.0%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	2	22.2%
		1	6	66.7%
		2	1	11.1%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	1	11.1%
		1	8	88.9%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	2	22.2%
		1	3	33.3%
		2	4	44.4%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	0	0.0%
		2	2	22.2%
		3	4	44.4%
		4	3	33.3%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	0	0.0%
		1	5	55.6%
		2	4	44.4%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	3	33.3%
		1	6	66.7%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	2	22.2%
		1	3	33.3%
		2	2	22.2%
		3	2	22.2%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	1	11.1%
		1	0	0.0%
		2	0	0.0%
		3	1	11.1%
		4	5	55.6%
		5	2	22.2%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	0	0.0%
		1	3	33.3%
		2	4	44.4%
		3	2	22.2%

## Institutional/Departmental Profile

Westmont College: June 2014 - Sociology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.89	89%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.56	52%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.22	41%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	42%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.89	89%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.56	52%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.89	44%
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	89%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.22	61%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.11	78%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.44	72%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.67	67%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	48%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.67	73%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.89	63%
<b>CAT Total Score</b>						<b>23.00</b>	<b>61%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Sociology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.89	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.56	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.22	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.89	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.56	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.89	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.22	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.11	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.44	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.67	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.67	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.89	1.15		
<b>CAT Total Score</b>						<b>23.00</b>	<b>19.04</b>		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2-tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

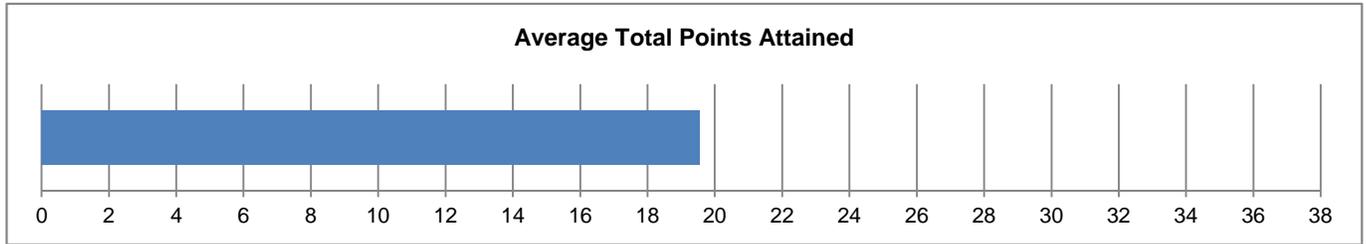
Westmont College

**CAT Institutional Report**

June 2014 - Natural & Behavioral Sciences

**CAT Overview: Descriptive Statistics for CAT Total Score**  
**Westmont College: June 2014 - Natural & Behavioral Sciences**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	18	8.00	36.00	19.56	7.60



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
Gender	Male	8	44.4%
	Female	10	55.6%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	1	5.6%
	Senior	17	94.4%
Class	Undergraduate	15	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	0	0.0%
	21-25 years	18	100.0%
	≥ 26 years	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
Race**	White	17	94.4%
	Black or African American	0	0.0%
	American Indian or Alaska Native	0	0.0%
	Asian	0	0.0%
	Native Hawaiian or Other Pacific Islander	0	0.0%
	Other Race	1	5.6%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
Proficiency with the English Language*	Excellent	16	88.9%
	Very Good	2	11.1%
	Good	0	0.0%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
Spanish/Hispanic/Latino Ethnicity	2	11.1%	
Considered English primary language?	18	100.0%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Natural & Behavioral Sciences

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	3	16.7%
		1	15	83.3%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	0	0.0%
		1	9	50.0%
		2	3	16.7%
		3	6	33.3%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	6	33.3%
		1	6	33.3%
		2	3	16.7%
		3	3	16.7%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	7	38.9%
		1	3	16.7%
		2	5	27.8%
		3	1	5.6%
		4	2	11.1%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	1	5.6%
		1	17	94.4%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	4	22.2%
		2	9	50.0%
		3	5	27.8%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	8	44.4%
		1	5	27.8%
		2	5	27.8%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	5	27.8%
		1	13	72.2%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	2	11.1%
		1	10	55.6%
		2	6	33.3%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	2	11.1%
		2	3	16.7%
		3	7	38.9%
		4	6	33.3%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	5	27.8%
		1	10	55.6%
		2	3	16.7%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	1	5.6%
		1	17	94.4%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	9	50.0%
		1	6	33.3%
		2	2	11.1%
		3	1	5.6%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	7	38.9%
		1	5	27.8%
		2	0	0.0%
		3	2	11.1%
		4	3	16.7%
		5	1	5.6%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	4	22.2%
		1	4	22.2%
		2	6	33.3%
		3	4	22.2%

## Institutional/Departmental Profile

Westmont College: June 2014 - Natural & Behavioral Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	83%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	61%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	39%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	33%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.94	94%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.06	69%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.83	42%
X				Q8	Determine whether an invited inference is supported by specific information.	0.72	72%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.22	61%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	74%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.89	44%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.94	94%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.72	24%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	1.56	31%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.56	52%
<b>CAT Total Score</b>						<b>19.56</b>	<b>51%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Natural & Behavioral Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	1.21	*	+0.60
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.94	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.06	1.56	*	+0.62
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.83	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.72	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.22	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.89	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.94	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.72	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	1.56	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.56	1.15		
CAT Total Score						19.56	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

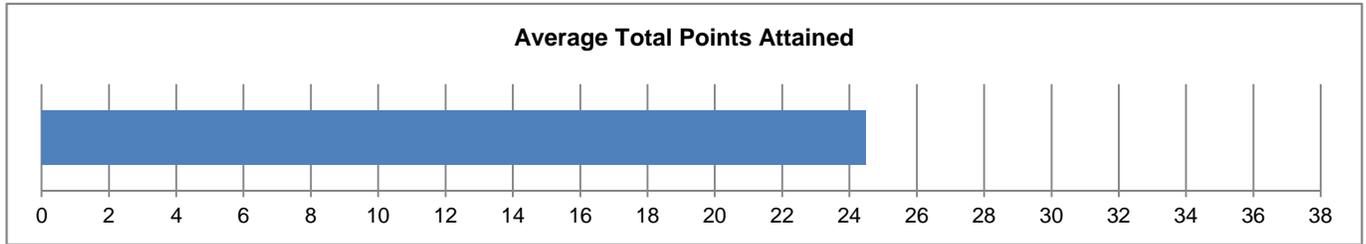
Westmont College

**CAT Institutional Report**

June 2014 - Computer Science

**CAT Overview: Descriptive Statistics for CAT Total Score  
Westmont College: June 2014 - Computer Science**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	8	12.00	36.00	24.50	7.13



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
Gender	Male	6	75.0%
	Female	2	25.0%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	1	12.5%
	Senior	7	87.5%
Class	Undergraduate	8	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	0	0.0%
	21-25 years	8	100.0%
	≥ 26 years	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
Race**	White	8	100.0%
	Black or African American	0	0.0%
	American Indian or Alaska Native	0	0.0%
	Asian	0	0.0%
	Native Hawaiian or Other Pacific Islander	0	0.0%
	Other Race	0	0.0%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
Proficiency with the English Language*	Excellent	8	100.0%
	Very Good	0	0.0%
	Good	0	0.0%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
Spanish/Hispanic/Latino Ethnicity	1	12.5%	
Considered English primary language?	8	100.0%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Computer Science

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0	1	12.5%
		1	7	87.5%
Q2	Evaluate how strongly correlational-type data supports a hypothesis.	0	0	0.0%
		1	2	25.0%
		2	1	12.5%
		3	5	62.5%
Q3	Provide alternative explanations for a pattern of results that has many possible causes.	0	2	25.0%
		1	3	37.5%
		2	0	0.0%
		3	3	37.5%
Q4	Identify additional information needed to evaluate a hypothesis.	0	0	0.0%
		1	2	25.0%
		2	4	50.0%
		3	0	0.0%
		4	2	25.0%
Q5	Evaluate whether spurious information strongly supports a hypothesis.	0	0	0.0%
		1	8	100.0%
Q6	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	2	25.0%
		2	2	25.0%
		3	4	50.0%
Q7	Identify additional information needed to evaluate a hypothesis.	0	2	25.0%
		1	4	50.0%
		2	2	25.0%
Q8	Determine whether an invited inference is supported by specific information.	0	1	12.5%
		1	7	87.5%
Q9	Provide relevant alternative interpretations for a specific set of results.	0	0	0.0%
		1	5	62.5%
		2	3	37.5%
Q10	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	1	12.5%
		2	1	12.5%
		3	3	37.5%
		4	3	37.5%
Q11	Use and apply relevant information to evaluate a problem.	0	1	12.5%
		1	5	62.5%
		2	2	25.0%
Q12	Use basic mathematical skills to help solve a real-world problem.	0	0	0.0%
		1	8	100.0%
Q13	Identify suitable solutions for a real-world problem using relevant information.	0	4	50.0%
		1	2	25.0%
		2	1	12.5%
		3	1	12.5%
Q14	Identify and explain the best solution for a real-world problem using relevant information.	0	0	0.0%
		1	2	25.0%
		2	0	0.0%
		3	2	25.0%
		4	3	37.5%
		5	1	12.5%
Q15	Explain how changes in a real-world problem situation might affect the solution.	0	1	12.5%
		1	2	25.0%
		2	2	25.0%
		3	3	37.5%

## Institutional/Departmental Profile

Westmont College: June 2014 - Computer Science

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.88	88%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	2.38	79%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.50	50%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.25	56%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	100%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.25	75%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.00	50%
X				Q8	Determine whether an invited inference is supported by specific information.	0.88	88%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.38	69%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.00	75%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.13	56%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	100%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.88	29%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.13	63%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.88	63%
<b>CAT Total Score</b>						<b>24.50</b>	<b>64%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Computer Science

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.88	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	2.38	1.21	*	+1.13
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.50	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.25	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.25	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.00	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.88	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.38	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.00	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.13	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.88	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.13	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.88	1.15		
<b>CAT Total Score</b>						<b>24.50</b>	<b>19.04</b>	<b>*</b>	<b>+ .83</b>

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

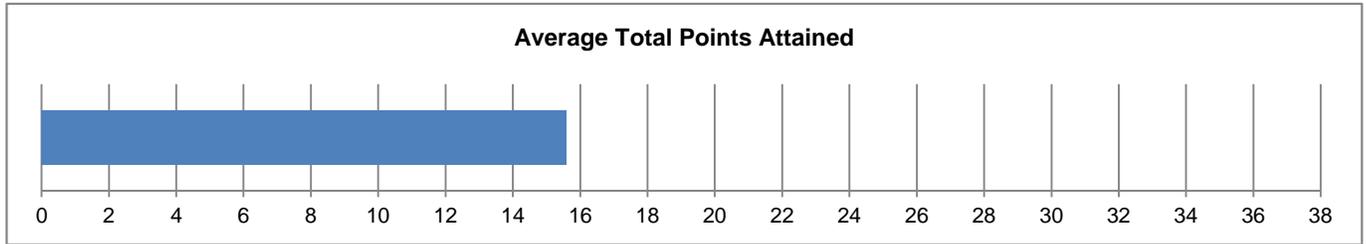
Westmont College

**CAT Institutional Report**

June 2014 - Psychology

**CAT Overview: Descriptive Statistics for CAT Total Score  
Westmont College: June 2014 - Psychology**

	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>CAT Total Score</b>	10	8.00	23.00	15.60	5.52



**CAT Demographics: Descriptive Statistics for Sample**

		<b>Freq.</b>	<b>Freq. %</b>
Gender	Male	2	20.0%
	Female	8	80.0%
Class Standing	Freshman	0	0.0%
	Sophomore	0	0.0%
	Junior	0	0.0%
	Senior	10	100.0%
Class	Undergraduate	7	100.0%
	Graduate	0	0.0%
Age	≤ 20 years	0	0.0%
	21-25 years	10	100.0%
	≥ 26 years	0	0.0%

		<b>Freq.</b>	<b>Freq. %</b>
Race**	White	9	90.0%
	Black or African American	0	0.0%
	American Indian or Alaska Native	0	0.0%
	Asian	0	0.0%
	Native Hawaiian or Other Pacific Islander	0	0.0%
	Other Race	1	10.0%

\*\*The cumulative percent may exceed 100% as students are allowed to select more than one category.

		<b>Freq.</b>	<b>Freq. %</b>
Proficiency with the English Language*	Excellent	8	80.0%
	Very Good	2	20.0%
	Good	0	0.0%
	Fair	0	0.0%
	Poor	0	0.0%

\* Self-rated

		<b>Freq.</b>	<b>Freq. %</b>
Spanish/Hispanic/Latino Ethnicity	1	10.0%	
Considered English primary language?	10	100.0%	

## CAT Breakdown: Frequency of Points Awarded for Each Question

Westmont College: June 2014 - Psychology

	Skill Assessed by CAT Question	Points Awarded	Freq.	Freq. %
<b>Q1</b>	Summarize the pattern of results in a graph without making inappropriate inferences.	0	2	20.0%
		1	8	80.0%
<b>Q2</b>	Evaluate how strongly correlational-type data supports a hypothesis.	0	0	0.0%
		1	7	70.0%
		2	2	20.0%
		3	1	10.0%
<b>Q3</b>	Provide alternative explanations for a pattern of results that has many possible causes.	0	4	40.0%
		1	3	30.0%
		2	3	30.0%
		3	0	0.0%
<b>Q4</b>	Identify additional information needed to evaluate a hypothesis.	0	7	70.0%
		1	1	10.0%
		2	1	10.0%
		3	1	10.0%
		4	0	0.0%
<b>Q5</b>	Evaluate whether spurious information strongly supports a hypothesis.	0	1	10.0%
		1	9	90.0%
<b>Q6</b>	Provide alternative explanations for spurious associations.	0	0	0.0%
		1	2	20.0%
		2	7	70.0%
		3	1	10.0%
<b>Q7</b>	Identify additional information needed to evaluate a hypothesis.	0	6	60.0%
		1	1	10.0%
		2	3	30.0%
<b>Q8</b>	Determine whether an invited inference is supported by specific information.	0	4	40.0%
		1	6	60.0%
<b>Q9</b>	Provide relevant alternative interpretations for a specific set of results.	0	2	20.0%
		1	5	50.0%
		2	3	30.0%
<b>Q10</b>	Separate relevant from irrelevant information when solving a real-world problem.	0	0	0.0%
		1	1	10.0%
		2	2	20.0%
		3	4	40.0%
		4	3	30.0%
<b>Q11</b>	Use and apply relevant information to evaluate a problem.	0	4	40.0%
		1	5	50.0%
		2	1	10.0%
<b>Q12</b>	Use basic mathematical skills to help solve a real-world problem.	0	1	10.0%
		1	9	90.0%
<b>Q13</b>	Identify suitable solutions for a real-world problem using relevant information.	0	5	50.0%
		1	4	40.0%
		2	1	10.0%
		3	0	0.0%
<b>Q14</b>	Identify and explain the best solution for a real-world problem using relevant information.	0	7	70.0%
		1	3	30.0%
		2	0	0.0%
		3	0	0.0%
		4	0	0.0%
		5	0	0.0%
<b>Q15</b>	Explain how changes in a real-world problem situation might affect the solution.	0	3	30.0%
		1	2	20.0%
		2	4	40.0%
		3	1	10.0%

## Institutional/Departmental Profile

Westmont College: June 2014 - Psychology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution/Department	
						Mean	Avg. % of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	80%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.40	47%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	0.90	30%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	0.60	15%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.90	90%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.90	63%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.70	35%
X				Q8	Determine whether an invited inference is supported by specific information.	0.60	60%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.10	55%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.90	73%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.70	35%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.90	90%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.60	20%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	0.30	6%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.30	43%
<b>CAT Total Score</b>						<b>15.60</b>	<b>41%</b>

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 - Psychology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.40	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	0.90	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	0.60	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.90	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.90	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.70	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.60	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.10	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.90	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.70	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.90	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.60	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	0.30	2.29	**	-1.50
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.30	1.15		
CAT Total Score						15.60	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## **Appendix D: Accuracy Report**

FROM: Kevin Harris, Associate Director

SUBJECT: Scoring Accuracy Check

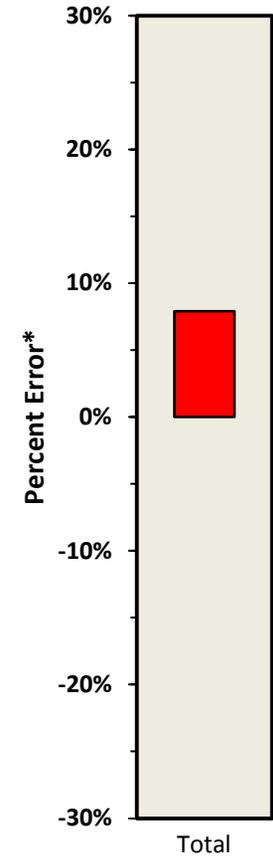
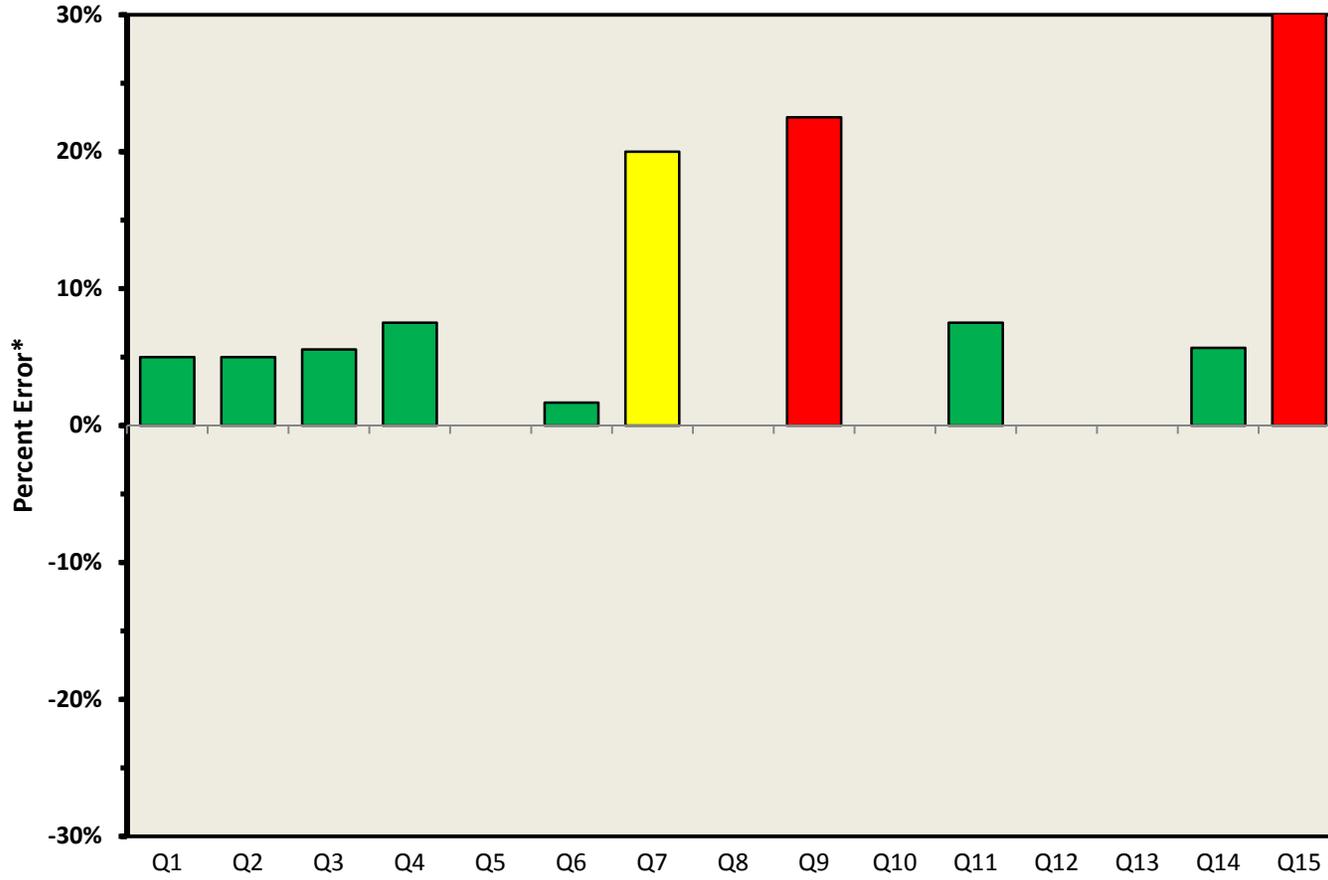
The information provided in this scoring accuracy check report was based on a random sample of tests from a scoring session conducted at your institution. The graphs illustrate the percent of error found in the sample on each question and for the overall test score. Bars colored in green indicate error that is well within an acceptable margin of error. Bars coded in yellow indicate error rates that are approaching concern. Bars coded in red indicate error rates that could lead to misinterpretation of results and indicate that the scoring guide or training module should be reviewed before the next scoring session.

In most cases the overall score will not be seriously affected by individual questions that fall in the red warning area because questions that are scored too leniently are balanced by other questions that are scored too strictly. Infrequently, there is a consistent bias in one direction that leads to a significant deviation in overall score accuracy. If this is the case and your overall score accuracy is coded in red, we recommend adjusting your overall score by the margin of error indicated in this report before comparing to national norms.

**Westmont College Accuracy Check**

Onsite Scoring Date: June 2014

Accuracy Check Date: July 2014



	Question Error
Green	<10%
Yellow	<20%
Red	>20%

	Total Error
Green	<3%
Yellow	<5%
Red	>5%

### Summary

Question #	Percent Error	Comments
Q1	5.00%	
Q2	5.00%	
Q3	5.56%	
Q4	7.50%	
Q5	0.00%	
Q6	1.67%	
Q7	20.00%	Graders awarded too many points on this item, please review training CD.
Q8	0.00%	
Q9	22.50%	Graders awarded too many points on this item, please review training CD.
Q10	0.00%	
Q11	7.50%	
Q12	0.00%	
Q13	0.00%	
Q14	5.67%	
Q15	33.33%	Graders awarded too many points on this item, please review training CD.
Total	7.89%	CAT Total Score is NOT validated for comparison to national norms.

**Appendix E: CAT Institutional Report – Data Transformed for Accuracy**

Westmont College

**CAT Institutional Report**

June 2014 - Data Transformed for Accuracy

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - All Students

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.82	0.67	**	+0.34
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.73	1.21	***	+0.49
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.36	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.41	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.92	0.73	***	+0.50
		X	X	Q6	Provide alternative explanations for spurious associations.	1.87	1.56	**	+0.39
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.65	0.82	*	-0.28
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	0.68	*	+0.30
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.03	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.04	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.14	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.57	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.18	1.15		
<b>CAT Total Score</b>						<b>20.37</b>	<b>19.04</b>		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Humanities

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.89	1.21	*	+0.66
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.56	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73	*	+0.87
		X	X	Q6	Provide alternative explanations for spurious associations.	1.94	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.45	0.82	*	-0.64
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	0.68	*	+0.57
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.02	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.06	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.78	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.67	1.15		
CAT Total Score						20.95	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2-tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Religious Studies

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.92	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.75	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.17	1.41		
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.75	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.30	0.82	*	-.91
X				Q8	Determine whether an invited inference is supported by specific information.	0.83	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.02	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.08	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.00	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.25	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	0.30	1.15	*	-1.00
CAT Total Score						19.21	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Philosophy

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.33	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.75	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	1.00	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.02	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.33	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.00	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	2.33	1.18	*	+1.12
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.83	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.41	1.15		
CAT Total Score						24.41	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Social Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.60	1.21	*	+0.35
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.35	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.49	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.86	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.74	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.69	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.80	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.00	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.03	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.86	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.20	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.99	2.29	*	+0.39
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.43	1.15		
CAT Total Score						20.79	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2-tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Economics & Business

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.77	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.62	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.40	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.42	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.85	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.81	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.66	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.77	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	0.98	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.88	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.88	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.92	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.12	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.76	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.42	1.15		
<b>CAT Total Score</b>						<b>20.26</b>	<b>19.04</b>		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Sociology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.89	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.56	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.22	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.67	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.89	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.56	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.80	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.89	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.07	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.11	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.44	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.67	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.44	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.67	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.45	1.15		
<b>CAT Total Score</b>						<b>22.31</b>	<b>19.04</b>		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Natural & Behavioral Sciences

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.83	1.21	*	+0.60
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.17	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.33	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.94	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.06	1.56	*	+0.62
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.75	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.72	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.07	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.94	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.89	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.94	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.72	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	1.56	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.20	1.15		
CAT Total Score						18.97	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Computer Science

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.88	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	2.38	1.21	*	+1.13
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.50	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.25	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	2.25	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.90	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.88	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.21	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.00	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.13	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	1.00	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.88	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.13	2.29		
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.44	1.15		
<b>CAT Total Score</b>						<b>23.77</b>	<b>19.04</b>		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

## Upper Division CAT Means Comparison Report

Westmont College: June 2014 (Transformed) - Psychology

Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm.		Skill Assessed by CAT Question	Institution	National		
						Mean	Mean	Probability of difference <sup>a</sup>	Effect Size <sup>b</sup>
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.80	0.67		
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.40	1.21		
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	0.90	1.35		
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	0.60	1.41		
x				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.90	0.73		
		X	X	Q6	Provide alternative explanations for spurious associations.	1.90	1.56		
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	0.63	0.82		
X				Q8	Determine whether an invited inference is supported by specific information.	0.60	0.68		
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	0.97	0.93		
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	2.90	3.14		
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	0.70	1.11		
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.90	0.82		
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	0.60	1.18		
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	0.30	2.29	**	-1.50
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.00	1.15		
CAT Total Score						15.13	19.04		

<sup>a</sup>. \* p<.05 \*\*p<.01 \*\*\*p<.001 (2 –tailed) Does not Account for entering ACT/SAT.

<sup>b</sup>. Mean difference divided by pooled group standard deviation.  
(0.1 - 0.3 = small effect; 0.3 - 0.5 = moderate effect; >0.5 = large effect)

The map of skills covered by each question above is a suggested theoretical guide for interpreting results.

**Appendix F: Total CAT Score by Division & Department with National Comparison**

**Total CAT Score by Division with National Comparison**  
**Westmont College: June 2014**  
**Adjusted for Accuracy**

Division	Adjusted CAT Score	National Comparison	Entering SAT	n	% of National Comparison
Humanities	20.94	24.27	1329	18	86.3%
Social Sciences	20.79	20.33	1122	35	102.2%
Natural & Behavior Sciences	18.97	21.81	1200	18	87.0%
Overall Westmont	20.37	21.80	1199	71	93.4%

Estimated National Comparison for upper division students with similar entering SAT scores irrespective of discipline.

**Total CAT Score by Department with National Comparison**  
**Adjusted for Accuracy**

Department	Adjusted CAT Score	National Comparison	Entering SAT	n	% of National Comparison
Religious Studies	19.22	24.34	1333	12	78.9%
Philosophy	24.41	24.11	1322	6	101.3%
Economics & Business	20.25	20.35	1123	26	99.5%
Sociology	22.31	20.28	1119	9	110.0%
Computer Science	23.77	23.03	1264	8	103.2%
Psychology	15.13	20.58	1136	10	73.5%

Estimated National Comparison for upper division students with similar entering SAT scores irrespective of discipline.

**Appendix G: CAT Sample SATs & GPAs with the Results of Bill Wright's Analysis**

**Westmont College CAT administered in Spring 2014**

##	Course	Instructor	Student ID	Transfer Students	ACT	SAT_Math	SAT_Verbal	GPA	Test #
1	EB-195	Paul Morgan	364636		26			2.523	80309
2			380555		28			3.444	80313
3			381988		25			3.204	88064
4			461068	transfer				2.653	80334
5			479691	transfer				3.119	88061
6			345686		23	600	490	3.409	80312
7			382514		22			3.181	88062
8			382725		27			3.490	88063
9			410616	transfer				2.910	88054
10			382676			530	580	3.239	80318
11			362028			620	510	3.636	80333
12			386166		22	510	530	2.740	88065
13			440810			440	400	2.227	88066
14			382513		27			2.672	88060
15			420569			700	780	2.639	87296
16			360747			610	580	3.590	80343
17			389798		25	560	560	3.226	87300
18			274426			510	560	2.824	80314
19			382378			510	540	3.300	80332
20			407703	transfer				3.260	87359
21			149245		26			3.353	87299
22			357769		24	510	530	2.851	88016
23			422487			460	470	3.180	80311
24			363994		23			2.948	80315
25			349386		27	690	570	2.762	88059
26			369843		21			2.052	80310
27	PSY-196	Andrea Gurney	389643			610	550	3.471	80307
28			375203		21	540	560	3.417	80341
29			382606			690	560	3.404	80340
30			365316			730	710	3.573	80342
31			285124		23			3.413	80306
32			346077			500	540	3.053	80305
33			372313			430	510	3.069	88099
34			358265		24	550	520	2.850	80308
35			446571	transfer student				2.997	87298
36			459823	transfer student				3.075	80304
37	SOC-195	Rachel Winslow	386143			650	690	3.476	80337
38			409742			460	500	3.547	88053
39			352730		21	500	570	2.925	80336
40			418973			490	510	3.483	88052
41			387899			490	470	2.785	87400
42			362569		24			3.305	88051
43			378510			640	690	3.286	80338
44			364809			610	590	2.912	80339
45			346081		25	530	560	3.727	87898
46	CS-195	Wayne Iba	341902			800	740	3.992	88069
47			388599			650	660	3.567	88098
48			389659			570	590	3.538	88056

49			356147		25			3.450	88067
50			413193		29	660	690	3.608	88058
51			424023			490	490	3.167	88057
52			377038			710	750	3.204	88055
53			352899			610	550	3.210	88068
54	PHI-195	Mark Nelson	347945			620	800	3.843	87295
55			408152			500	650	3.422	87297
56			300064		31			3.820	87345
57			286191			590	680	3.397	87361
58			347218		30			3.628	87360
59			377646		34	730	700	3.539	87294
60	RS-180	Telfor Work/	395760		30	670	560	3.580	87320
61		Helen Rhee	398031			650	690	3.506	87291
62			405924			700	780	2.818	87319
63			390990			610	640	3.254	87292
64			362402			680	660	3.729	87290
65			374470		28	620	640	3.667	80335
66			343109		31	690	740	3.753	87321
67			380886			620	620	3.826	87318
68			389432			560	610	3.263	87322
69			344644			690	790	3.845	87323
70			382079			750	690	3.631	87324
71			347765		20			3.246	87293
72			364696			670	670	3.613	87325

Mean GPA of Group	3.268
Correlation: GPA to SAT Math	0.453728
Correlation: GPA to SAT Verbal	0.428162
Correlation: GPA to SAT Total	0.469264
Correlation: GPA to Total CAT score	0.183499
Correlation: Total CAT score to SAT Verbal	0.423209
Correlation: Total CAT score to SAT Math	0.281
Correlation: Total CAT score to SAT Total	0.377498

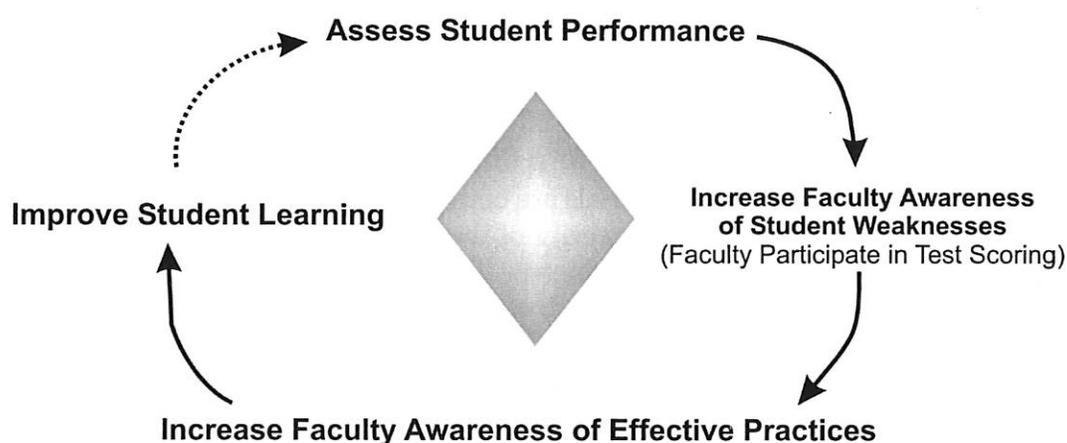
Mean GPA of Class of 2014: 3.277

**Appendix H: Effective Practices for Improving Students' Critical Thinking and Problem Solving Skills**

## Effective Practices for Improving Students' Critical Thinking and Real-world Problem Solving

One important feature of the CAT instrument is the role it can play in faculty development. The CAT scoring sessions provide a unique opportunity for faculty to discuss critical thinking while at the same time personally experiencing their students' weaknesses in the area of critical thinking. Indeed, there is probably no better time to create a dialogue about effective practices than when faculty are being made aware of students' weaknesses. The CAT scoring sessions provide an opportunity to develop a teaching community where faculty come together to identify student weaknesses and discuss effective practices for improving students' critical thinking and real-world problem solving skills.

### Closing the Loop in Assessment and Quality Improvement



The information in this section provides a brief overview of effective practices for improving student's critical thinking and real-world problem solving skills that will impact performance on the CAT instrument.

### Skill areas assessed by the CAT instrument

The skill areas on the CAT assessment were developed by an interdisciplinary team of faculty and validated by other faculty across the country. While the list is not exhaustive of all possible skills related to critical thinking/real world problems solving, it may be the best consensus of skills that faculty across disciplines agree are important components of critical thinking. These skills should be the targets of efforts designed to improve students' critical thinking and their performance on the CAT instrument. We believe that it is beneficial to consider how effective practices should be implemented to maximize the impact of skill development in these areas.

#### Evaluating Information and Other Points of View

- Separating factual information from inferences.
- Interpreting numerical relationships in graphs.
- Understanding the limitations of correlation data.
- Evaluating evidence and identifying inappropriate conclusions.

### Creative Thinking

- Identifying alternative interpretations for data or observations.
- Identifying new information that might support or contradict a hypothesis.
- Explaining how new information can change a problem.

### Learning & Problem Solving

- Separating relevant from irrelevant information.
- Integrating information to solve problems.
- Learning and applying new information.
- Using mathematical skills to solve real-world problems.

### Communication

- Communicating ideas effectively.

## **Developing Parallel Learning Activities to CAT Instrument Questions**

The questions used on the CAT instrument are specifically designed to simulate real-world experiences that require critical thinking. These problems can serve as models for constructing discipline specific analogs that can be used as instructional tools for involving students in active learning that encourages critical thinking. Although it is extremely important to protect the integrity of the CAT test and not release its contents, we encourage faculty to think about developing their own discipline-specific activities that provide opportunities to practice skills assessed by the CAT questions and using those activities to involve students in active learning experiences that help them improve their critical thinking skills. These activities should be part of how students' performance is assessed in the course.

After faculty have had the opportunity to score the test, it would be beneficial to have them work in groups to identify parallel learning activities for the CAT questions that could be used in their courses as opportunities to develop students' critical thinking. Part I of the test involves a series of questions related to the important components of critical thinking. Questions in this part of the test can be divided into related sections, and analogs can be developed for these sections. For example, not only could a different advertising claim be used as part of journalism or advertising class, theoretical claims in a discipline's literature could be used as well. For example, students in an environmental engineering or biology class could evaluate claims by experts that global warming is not occurring.

Part II of the test involves a real-world problem solving experience that should have parallel activities in all disciplines. The prompts below might encourage the development of such activities. Keep in mind that these learning experiences should create opportunities to develop the skills targeted by the CAT instrument. For example, if students must use additional resources to solve problems, provide opportunities to differentiate relevant from irrelevant material as they search for additional information needed to solve the problem.

- Select the best alternative energy source for a particular region.
- Select the best piece of equipment needed for a particular task.
- Select the best economic development plan for a particular region.
- Select the best public health care policy for a country.
- Select the best strategy for reducing pollution.

## **Creating Active Learning and Real-World Problem Solving Experiences**

There are numerous examples of effective practices in each discipline to encourage active learning and involve students in real-world problem solving. A variety of these methods are discussed below. These types of experiences provide opportunities to develop students' critical thinking by presenting issues and problems that stimulate original thought while utilizing previously acquired knowledge or finding and applying new information. Consider how to structure these activities so that they maximally impact critical thinking and real-world problem solving.

### **Some General Principles for Construction of Activities**

Although effective practices vary with disciplines, course objectives, students' interests, and other factors, there are some general principles that you should consider when constructing activities to improve students' critical thinking/real-world problem solving. First, you should use some type of active learning to engage students in the learning process. Having students solely memorize information has a negative relationship with critical thinking and CAT scores in particular. Select activities and topics within those activities that are interesting to your students. Students who are interested will be more motivated and thus put more time, energy, and effort into the learning process. Information and activities should be presented in a way that is seen as appropriate, meaningful, and organized by students. Assessment of students should be related to the outcome goals including the learning of critical thinking and real world problem solving. It is often helpful for students to have the opportunity to learn collaboratively. For general guidance on maximizing student learning, we recommend *How People Learn* which can be found online from National Academies Press at [http://www.nap.edu/openbook.php?record\\_id=6160](http://www.nap.edu/openbook.php?record_id=6160). Listed below are some effective practices that can be used to teach critical thinking and real-world problem solving.

### **Service Learning**

Service learning can be used to aid in critical thinking performance by providing meaningful learning experiences in local communities, such as allowing engineering students to design playgrounds for underfunded neighborhoods. Students would be presented with the problem of creating a playground with available material, which is fun, safe, affordable, and accessible to individuals with physical impairments. Students would gather information from various sources and evaluate the best possible solutions. They would then present their findings to the local communities. Excellent sources of information on conducting service learning projects can be found at the National Service-Learning Clearinghouse at [www.servicelearning.org](http://www.servicelearning.org) and Campus Compact at [www.compact.org](http://www.compact.org).

### **Debates**

A debate on global warming may be utilized to stimulate creative thinking among biology students. One group would be told to gather research to defend the theory that global warming is a natural cycle the earth goes through. Another group would gather research that supported the claim that global warming is caused by pollution. Each group would be given research on global warming and required to find the relevant research and differentiate it from irrelevant information, analyze claims, and synthesize information from multiple sources by effectively communicating their argument. However, students should not just research their position on

global warming; they should also have to research the opposing view. This helps them understand opposing perspectives, as well as anticipate the arguments of the opposition. When using strategies such as debates, you will be most successful if your evaluation of your students corresponds to your teaching goals. Therefore, your debates will be more successful when the students are provided at the outset with your evaluation rubric which should correspond to such critical thinking components as separating factual information from inferences, identifying inappropriate conclusions, and separating relevant from irrelevant information.

## **Simulations**

Simulations could be utilized in which sociology students are assigned characters that represents an individual of another social, economical, or cultural group. The students are given constraints for each character. The students then randomly select life events throughout the semester, such as “you’re involved in a car accident and receive \$4000 in related bills.” This would affect each individual character differently and require students to figure out how changes in the nature of a problem may affect the best solution, identify additional information that is relevant, and differentiate relevant from irrelevant information, and synthesize information from multiple sources.

## **Case Studies**

Case studies have been used extensively for many years across many disciplines including business and law. An example of case-based instruction in business ethics would be to teach about “Sustainable Value: How the World’s Leading Companies are Doing Well by Doing Good.” This and other examples of case studies across disciplines can be found at [www.caseplace.org](http://www.caseplace.org). Many other interdisciplinary examples of case-based instruction exist, such as the Legacy Cycle; examples of the use of the Legacy Cycle can be found at <https://repo.vanth.org/portal/matrix> or [www.scientificjournals.org/journals2007/articles/1088.pdf](http://www.scientificjournals.org/journals2007/articles/1088.pdf).

## **Real-World Problem Solving Tasks**

Having students solve real-world problems can be an effective tool in any field. For example, students in education could be asked to write a grant proposal for selecting a computer system for their classroom. In addition to being able to communicate effectively, students are required to develop skills in research, separate relevant from irrelevant information, separate factual information from inferences, among other skills. If you would like to have students also learn how new information might change the problem, you could add additional constraints such as a budget limit, a particular type of classroom, or different characteristics of the students.

## **Involving Students in Original Research**

We have found a positive relationship between student involvement in original research projects and their performance on the CAT instrument. These research experiences can be beneficial because they provide students with opportunities to develop skills in many of the areas that are evaluated by the CAT instrument.

An example of involving students in original research would be to have students participate in conducting a research project in their given discipline. A biology student may have to form a hypothesis about water quality issues at a local park. The student would then design an experiment to test their hypothesis, conduct the experiment by collecting data, and analyze the

data to evaluate their hypothesis. There should be opportunities to evaluate alternative explanations for the findings and for identifying what additional information might be needed to support their hypothesis. These experiences provide opportunities to develop many of the skills assessed by the CAT instrument. In fact, having students present their findings to the class or in written form would also help develop communication skills that are assessed by the CAT instrument.

Students in nursing or other health care fields could make a documentary on an issue such as Hospital Acquired Infections (HAI). As part of the documentary, students could explore the factors related to Hospital Acquired Infections and develop solutions to reduce the number of Hospital Acquired Infections while providing an effective educational tool for others in health care fields. In this documentary, students can also address how changes to the nature of the problem can impact the potential solution by exploring how recent changes in the types of bacterial infections have provided new challenges for health care professionals.

## **Appendix I: Effectively Using the CAT for Assessment**

# Effectively Using the CAT Instrument to Assess Student Learning

## Assessment Models/Designs

The CAT instrument is adaptable to a variety of assessment goals and designs. We discuss these assessment goals and some of the more frequently used models below.

The CAT instrument can be used for a variety of assessment goals.

- Evaluate effects of college education
- Evaluate effects of a program of study
- Evaluate effects of a course
- Evaluate effects of informal learning experiences

There are a variety of assessment designs that can be employed with the CAT instrument. The CAT instrument is very adaptable to various research/assessment designs because the test is very sensitive to treatment effects and because the test can be used with all levels of college students without floor effects (students obtaining the minimum score possible) or ceiling effects (students obtaining the maximum score possible). These include:

- Pre-test/Post-test designs
  - Test students at the beginning and end of course or experience (with or without a control group).
  - Test students when they are freshmen and then again when they are seniors (true value added).
- Cross-sectional studies
  - Compare freshmen to seniors (typical value-added analysis).
- Evaluate changes in program outcomes over time
  - Compare scores on the CAT after program improvements to established baseline scores that precede program changes.
  - Compare scores on the CAT to national norms over time and look for improvements.
- Evaluate changes in programs or courses by comparison to a control group.
  - Compare scores on the CAT for students who have had special courses/experiences to those for a control group who have not had the special courses/experiences.

## Reducing Costs with Appropriate Sampling

We advocate a variety of practices to reduce the cost of testing without compromising the accuracy of the assessment. For example, various sampling strategies can be used to reduce the need to test all students. If that is not possible, then only a sample of the tests given might be scored. We discuss two accepted methods of sampling to ensure valid and representative results. However, we realize that the sampling techniques are not feasible

at all institutions. Center staff will be happy to discuss these and other alternatives in more detail.

1. Random sampling: A subset of the student population of interest is randomly selected for testing/scoring. The larger the sample, the more confidence there is that the sample is representative of the population of interest. In a random sample, all students have an equal chance of being selected. This is not to be confused with a convenience sample that includes only those students who volunteer to take the test.
2. Stratified random sampling: The population is divided into subgroups (e.g., Arts & Sciences, Engineering, Education, etc.). A random sample of students within each subgroup is then selected. The number of students in each randomly sampled subgroup should be proportional to that group's proportion of the population. Stratification can help ensure a more representative sample with smaller sample sizes.

## **Sampling after Test Administration**

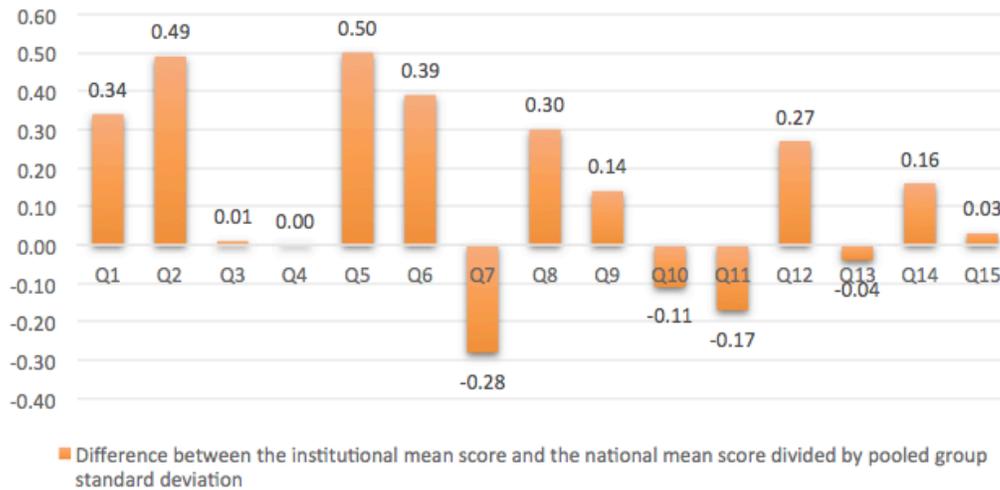
In many institutions it is not possible to administer the test to a random sample of students within a class. In these situations, we recommend administering the test to the larger group and then randomly sampling tests from that group to score during the faculty scoring session. This procedure will allow institutions to achieve a more representative sample without greatly increasing the faculty time needed to score tests. We recommend having a minimum of 10 - 15 tests or pairs of tests per group (e.g., class, program of study, etc.).

## **Scoring Accuracy Checks**

At various times during the year, we conduct analyses of scoring accuracy and provide feedback about the accuracy of scoring and, if necessary, specific recommendations for improving the accuracy of scoring on a question-by-question basis. These reports are sent separately from the institutional summary report.

**Appendix J: Difference between Westmont Mean and National Mean by Question  
(Graph)**

## Upper Division CAT Mean Comparison Report



Q1: Summarize the pattern of results in a graph without making inappropriate inferences.

Q2: Evaluate how strongly correlational-type data supports a hypothesis.

Q3: Provide alternative explanations for a pattern of results that has many possible causes.

Q4: Identify additional information needed to evaluate a hypothesis.

Q5: Evaluate whether spurious information strongly supports a hypothesis.

Q6: Provide alternative explanations for spurious associations.

Q7: Identify additional information needed to evaluate a hypothesis.

Q8: Determine whether an invited inference is supported by specific information.

Q9: Provide relevant alternative interpretations for a specific set of results.

Q10: Separate relevant from irrelevant information when solving a real-world problem.

Q11: Use and apply relevant information to evaluate a problem.

Q12: Use basic mathematical skills to help solve a real-world problem.

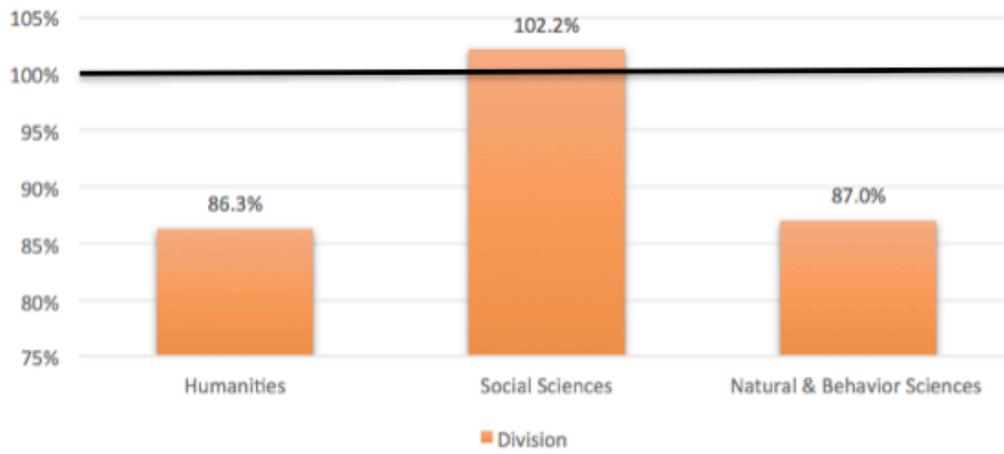
Q13: Identify suitable solutions for a real-world problem using relevant information.

Q14: Identify and explain the best solution for a real-world problem using relevant information.

Q15: Explain how changes in a real-world problem situation might affect the solution.

**Appendix K: Percentage of National Overall Mean Score by Division (Graph)**

## Total CAT Score by Division with National Comparison



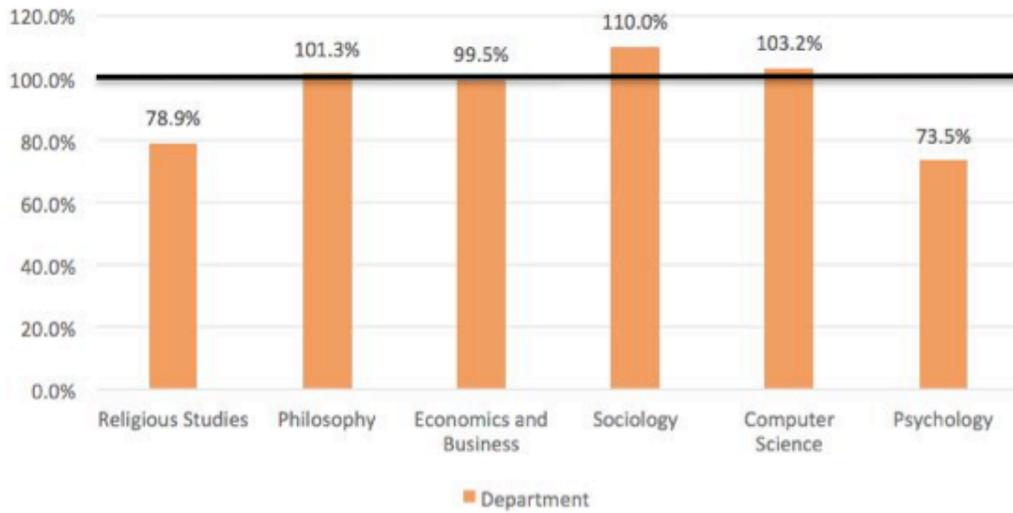
### Total CAT Score by Division with National Comparison Westmont College: June 2014 Adjusted for Accuracy

Division	Adjusted CAT Score	National Comparison	Entering SAT	n	% of National Comparison
Humanities	20.94	24.27	1329	18	86.3%
Social Sciences	20.79	20.33	1122	35	102.2%
Natural & Behavior Sciences	18.97	21.81	1200	18	87.0%
Overall Westmont	20.37	21.80	1199	71	93.4%

Estimated National Comparison for upper division students with similar entering SAT scores irrespective of discipline.

**Appendix L: Percentage of National Overall Mean Score by Department (Graph)**

**Total CAT Score by Department with National Comparison**



**Total CAT Score by Department with National Comparison  
Adjusted for Accuracy**

Department	Adjusted CAT Score	National Comparison	Entering SAT	n	% of National Comparison
Religious Studies	19.22	24.34	1333	12	78.9%
Philosophy	24.41	24.11	1322	6	101.3%
Economics & Business	20.25	20.35	1123	26	99.5%
Sociology	22.31	20.28	1119	9	110.0%
Computer Science	23.77	23.03	1264	8	103.2%
Psychology	15.13	20.58	1136	10	73.5%

Estimated National Comparison for upper division students with similar entering SAT scores irrespective of discipline.