

# Research Reports

Institutional Assessment  
Boise State University

## ***Skill Level Performance on the Academic Profile: A Measure of General Academic Knowledge***

***Research Report 2005-01***

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### **ABSTRACT**

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This study looked at proficiency levels that students demonstrated on the Academic Profile in reading, writing, and mathematics. Comparisons were made to previous freshman performance as well as to the performance of sophomores at other Master's (Comprehensive) Colleges and Universities. Our students improved their skills over time in all three areas and at all levels. Though the percentage of our students who tested as proficient at the highest levels remained low even after several years of taking general education courses, sophomores at other institutions fared no better.

## **SKILL LEVEL PERFORMANCE ON THE ACADEMIC PROFILE: A MEASURE OF GENERAL ACADEMIC KNOWLEDGE**

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How well do our students perform on a test of general academic knowledge and skills that includes material usually covered in courses taken during the first two years of college? A previous study ([RR 2002-03](#)) indicated that 20% of new entering freshmen lacked proficiency at even the lowest level of mathematics skills, 17% at the lowest level of reading skills, and 14% at the lowest level of writing skills when measured by the Academic Profile. Now a subset of these entering freshmen have re-taken the test after having enrolled in much of their general education curriculum. We already know that students who re-took the test significantly improved their total scores (see [RR 2004-06](#)). This is a norm-referenced assessment, however, and does not provide specific information on what students are expected *to do* at different skill levels. This report asks the question: "Where and how much did their performance improve when measured against proficiency levels in reading, writing, and mathematics?" Results are based on 623 new freshmen tested in fall of 2001 and a subset of 91 who were re-tested in the spring of 2004. For a norm group, results from sophomores at other Master's level institutions who had completed 30-60 semester hours were employed.

# Results

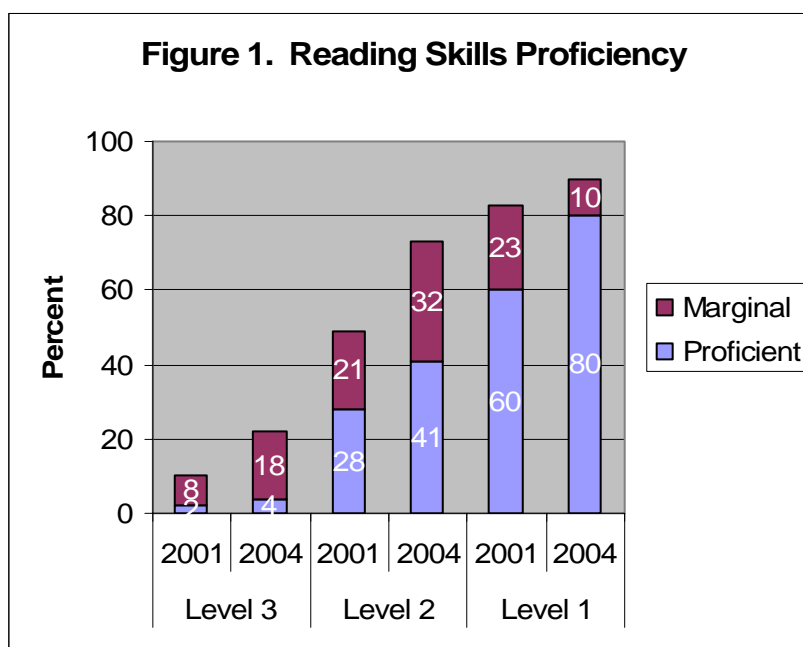
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## Reading/Critical Thinking Results:

Reading on the Academic Profile had three levels of proficiency, with Level 3 being a measure of critical thinking. Specific skills were identified for each level. To be proficient at the lowest level of reading (Level 1), students were expected to be able to do the following:

- Recognize factual material explicitly presented in a reading passage.
- Understand the meaning of words or phrases in the context of a reading passage.

As shown by Table 1 and Figure 1 below, 60% of new 2001 freshmen were considered proficient in these reading skills; that figure moved to 80% when students were tested in spring of 2004. The figure jumped to 90% for recent testees when those students who were considered marginal at level 1 were included. By contrast, only 65% of the norm group was proficient at Level 1.



To reach proficiency at Level 2 in Reading, students were expected to:

- Synthesize material from different sections of a passage.
- Recognize valid inferences derived from material in the passage.
- Identify accurate summaries of a passage or of significant sections of the passage.
- Understand and interpret figurative language.
- Discern main idea, purpose, or focus of a passage or of a passage or a significant portion of a passage.

Clearly, these were higher level skills that students were expected to master. Only 28% of 2001 entering freshmen reached proficiency at this level of reading skill. In 2004, however, the figure jumped to 41%. This was a strong improvement but still less than half of the group had reached competence at Level 2. By comparison, however, only 30% of the sophomore norm group reached proficiency.

Level 3 Reading was labeled as “Critical Thinking.” Students who were thinking critically in reading were expected to:

- Evaluate competing casual explanations.
- Evaluate hypotheses for consistency with known facts.
- Determine the relevance of information for evaluating an argument or conclusion.
- Determine whether an artistic interpretation is supported by evidence contained in a work.
- Recognize the salient features or themes in a work of art.
- Evaluate the appropriateness of procedures for investigating a question of causation.
- Recognize flaws and inconsistencies in an argument.

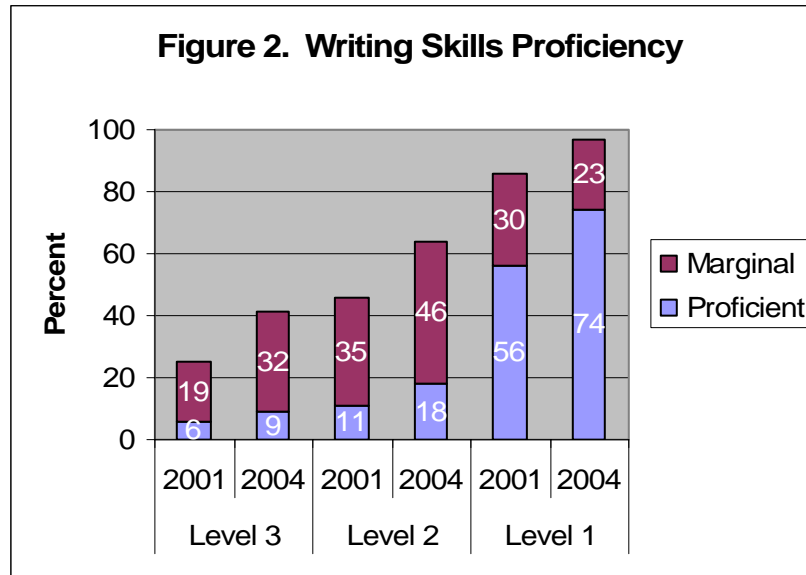
Very few students reached this level. Though the percentage judged proficient in critical thinking doubled from 2001 to 2004, only 2% were at Level 3 in 2001 and only 4% were there in 2004. Even when those who were marginal were included, the figure was still less than 25% of test-takers in 2004. The percentage of Boise State students who were proficient in 2004 was the same as the norm group.

### **Writing Results:**

On the Academic Profile, students did not produce an essay or other direct evidence of their writing. Instead, they selected from options provided to them. For example, they were shown sentences and asked the best way to re-write the sentence given four choices. Again, proficiency was measured at three levels. At level 1, students were expected to:

- Recognize agreement among basic grammatical elements (e.g. nouns, verbs, pronouns, conjunctions).
- Recognize appropriate transition words.
- Recognize incorrect word choice.
- Order sentences in a paragraph.
- Order elements in an outline.

The percentage of students who lacked proficiency at even the lowest level of writing showed a marked drop from 14% of new freshmen in 2001 to only 3% in 2004. The percentage who were fully proficient moved from 56% to 74%. Only 69% of students in the sophomore norm group were proficient at Level 1. See details in Figure 2 below or Table 2.



At level 2 of writing, students had to be able to do the following:

- Incorporate new material into a passage.
- Recognize agreement among basic grammatical elements (e.g. nouns, verbs, pronouns, conjunctions) when these elements are complicated by intervening words or phrases.
- Combine simple clauses into single, more complex combinations.
- Recast existing sentences into new syntactic combinations.

This set of tasks was much more difficult for students to do. Only 11% were fully proficient when they entered college in 2001, and only 18% were fully proficient in 2004, a figure similar to the Sophomore norm group.

At level 3 students had to be able to:

- Discriminate between appropriate and inappropriate uses of parallelism.
- Discriminate between appropriate and inappropriate uses of idiomatic language.
- Recognize redundancy.
- Recognize the most effective revision of a sentence.

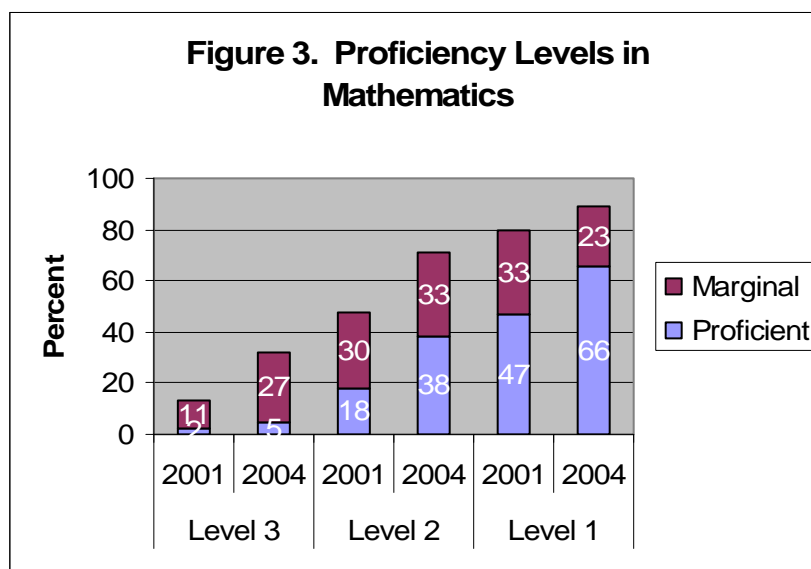
Only 6% of new freshmen were fully capable of performing at this level in 2001. The percentage crept up to 9% in 2004, though an additional 32% were approaching competence at this level. These results exceeded those for the Sophomore norm group.

### Mathematics Results:

New 2001 freshmen were least prepared in the area of mathematics with 20% failing to meet even the first level of proficiency. This meant that they were unable to:

- Solve word problems that would most likely be solved by arithmetic and do not involve conversion of units or proportionality. (These problems can be multi-step if the steps are repeated rather than embedded.)
- Solve problems involving the informal properties of numbers and operations, often involving the Number Line, including positive and negative numbers, whole numbers and fractions (including conversions of common fractions to percents, such as converting  $\frac{1}{4}$  to 25%).
- Solve problems requiring a general understanding of square roots and the squares of numbers.
- Solve a simple equation or substitute numbers into an algebraic expression.
- Find information from a graph. This task may involve finding a specified piece of information in a graph that also contains other information.

By the spring of 2004, 11% of re-testers were still unable to meet level 1 standards. However, almost two-thirds were proficient at level 1 (see Figure 3 and Table 3). By comparison, only 55% of the sophomores included in the norm group were proficient at Level 1.



At level 2 of mathematics, the percentage who were proficient increased to 38% from 18% in the Fall of 2001. However, only 24% of sophomores in the norm group were proficient. At this level, students were expected to:

- Solve arithmetic problems with some complications, such as complex wording, maximizing or minimizing, and embedded ratios. These problems include algebra problems that can be solved by arithmetic (the answer choices are numeric).
- Simplify algebraic expressions, perform basic translations, and draw conclusions from algebraic equations and inequalities. These tasks are more complicated than solving a simple equation, though they may be approached arithmetically by substituting numbers.
- Interpret a trend represented in a graph, or choose a graph that reflects a trend.
- Solve problems involving sets; the problems would have numeric answer choices.

Few students met the highest level of proficiency in math either in 2001 or 2004. Only 2% of new freshmen were proficient at level 3; the figure rose to 5% in 2004 (a figure identical to the norm group). Students who met these standards were able to:

- Solve word problems that would unlikely be solved by arithmetic; the answer choices are either algebraic expressions or are numbers that do not lend themselves to back-solving.
- Solve problems involving difficult arithmetic concepts such as exponents and roots other than squares and square roots and percent of increase or decrease.
- Generalize about numbers, e.g. identify the values of (x) for which an expression increases as (x) increases.
- Solve problems requiring an understanding of the properties of integers, rational numbers, etc.
- Interpret a graph in which the trends are to be expressed algebraically or in which one of the following is involved: exponents and roots other than squares and square roots, percent of increase or decrease
- Solve problems requiring insight or logical reasoning.

## SUMMARY AND CONCLUSIONS

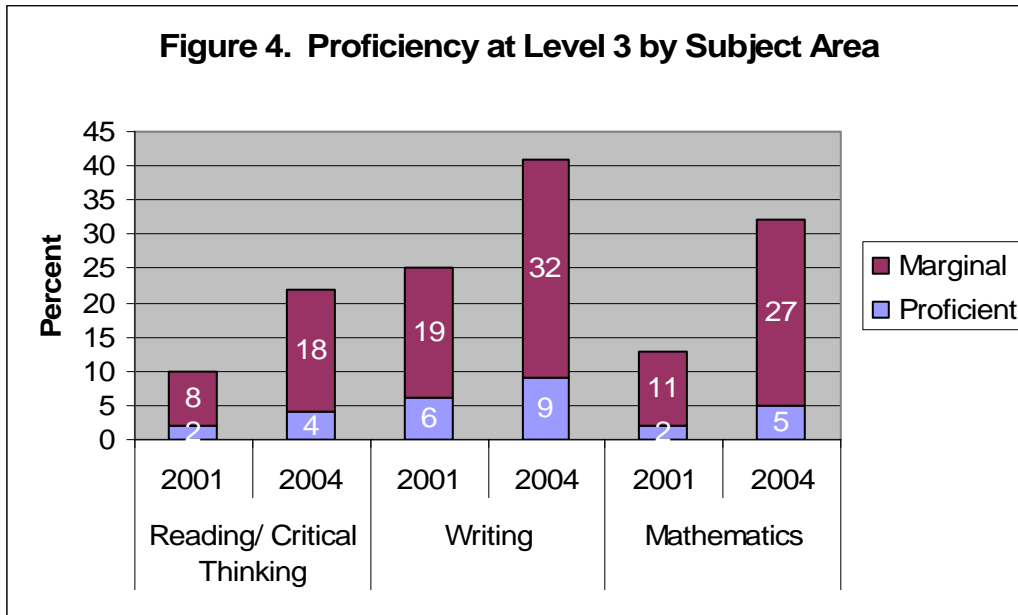
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In this study, we looked at changes in proficiency levels on the Academic Profile as a way to see where students had improved during the time they were taking most of their general education courses. We also sought to identify those skill areas that remained weak.

The conclusions reached about student competency in the skill areas of reading, writing, and mathematics depended upon whether one was interested in minimal competency (level 1) or the highest level of competency (level 3). New freshmen were least likely to meet even minimal proficiency standards in mathematics with 20% failing to meet even level 1 standards. Students were most prepared for college in the area of writing where 14% failed to meet minimal (level 1) standards. As shown by Figure 4 below, very few new freshmen met level 3 standards in any area.

At the highest competency levels, students were most likely to meet the standards in writing (9% competent at level 3 in 2004) and least likely to meet the critical thinking (level 3 reading) standards with only 4% judged competent at this level. At the minimum competency levels, students remained least likely to meet minimal standards in mathematics with 66% meeting level 1 standards in 2004. They were most likely to meet the minimal standards in reading, with 80% competent at level 1.

Thus, we can conclude that students entered weakest in mathematics and remained weakest in this skill area. Students' greatest strength was writing when they entered Boise State, and it remained that way after several years at the university. Reading was the area where students with several years of core experiences were most likely to demonstrate minimal competency. Reading was also the area, however, where students were *least* likely to demonstrate level 3--critical thinking--skills (see Figure 4).



Mathematics was also the area where students demonstrated the greatest gains between 2001 and 2004. Though 2001 freshmen were not required to complete a core course in mathematics, many students enrolled in “preparatory courses” such as MATH 25 or MATH 108 anyway. In addition, many students had to complete math requirements because of their majors, even though their general education requirements did not mandate a math requirement. Students also dealt with quantitative data in science courses and economics, to name two areas that deal with a variety of numerical data.

Reading was the area where students showed the least change, at least at the higher levels of proficiency. This means that students were least likely to improve their critical thinking skills (at least as measured through reading). When combined with the information that students were *most* likely to be minimally competent in reading of the three skill areas tested at level 1, it appears that students learn to digest information in their college courses but that they do not think very well about what they have digested. It is likely that in general education courses, students receive a great deal of information which they memorize. Results from our freshmen who took the National Survey of Student Engagement (NSSE) support this conclusion. For example, over 70% of freshmen indicated that quite a bit or very much of their time was spent memorizing facts so they could be repeated in much the same form. By contrast, seniors who took the NSSE were most likely to report that they analyzed, evaluated, and synthesized information.

It is difficult to define “critical thinking” to the satisfaction of everyone, let alone agree on how to address it. However, most instructors who have spent time developing the critical thinking skills of their students agree that students must be taught this skill, and that it seldom unfolds without explicit guidance on the steps that must be taken to work their way through the process. How the skill is taught will depend upon the subject area. In addition, students who have developed critical thinking skills in one subject area often will be unable to transfer those skills

to another subject area because of differences in how “thinking” occurs in each discipline and the underpinnings that must be mastered before students can move to higher cognitive levels.

Boise State students generally performed as well as or better than sophomores at other institutions with the designation of Master’s (Comprehensive) Colleges and Universities I and II. At level 3, the percentage who were proficient in reading and math was identical to the norm group. In writing at level 3, the percentage exceeded the norm group. At levels 1 and 2, Boise State students outperformed the norm group in all three areas.

We can be pleased that our students showed progress in skills development during the time they take most of their general education courses. We can also be dissatisfied with the proficiency levels that students demonstrate in these general skill areas. Changing these results, however, will require focused attention across a variety of courses.

Table 1. Performance on Reading Skills as Measured by the Academic Profile

Skill Level	Proficiency Classification			
	Proficient	Marginal	Not Proficient	Total
Critical Thinking (Level 3 Reading)				
2001 (BSU Entering Freshmen)	2%	8%	90%	100%
2004 (BSU Sophomore/Junior)	4%	18%	78%	100%
<b>Norm Group (Sophomores)</b>	4%	12%	84%	100%
Reading, Level 2				
2001 (BSU Entering Freshmen)	28%	21%	51%	100%
2004 (BSU Sophomore/Junior)	41%	32%	27%	100%
<b>Norm Group (Sophomores)</b>	30%	22%	47%	100%
Reading, Level 1				
2001 (BSU Entering Freshmen)	60%	23%	17%	100%
2004 (BSU Sophomore/Junior)	80%	10%	10%	100%
<b>Norm Group (Sophomores)</b>	65%	20%	14%	100%

Table 2. Performance on Writing Skills as Measured by the Academic Profile

Skill Level	Proficiency Classification			
	Proficient	Marginal	Not Proficient	Total
Writing Level 3				
2001 (BSU Entering Freshmen)	6%	19%	75%	100%
2004 (BSU Sophomore/Junior)	9%	32%	59%	100%
<b>Norm Group (Sophomores)</b>	6%	27%	66%	100%
Writing Level 2				
2001 (BSU Entering Freshmen)	11%	35%	54%	100%
2004 (BSU Sophomore/Junior)	18%	46%	36%	100%
<b>Norm Group (Sophomores)</b>	17%	37%	46%	100%
Writing Level 1				
2001 (BSU Entering Freshmen)	56%	30%	14%	100%
2004 (BSU Sophomore/Junior)	74%	23%	3%	100%
<b>Norm Group (Sophomores)</b>	69%	23%	8%	100%

Table 3. Performance on Mathematics Skills as Measured by the Academic Profile

Skill Level	Proficiency Classification			
	Proficient	Marginal	Not Proficient	Total
Mathematics Level 3				
2001 (BSU Entering Freshmen)	2%	11%	87%	100%
2004 (BSU Sophomore/Junior)	5%	27%	67%	100%
<b>Norm Group (Sophomores)</b>	5%	15%	80%	100%
Mathematics Level 2				
2001 (BSU Entering Freshmen)	18%	30%	51%	100%
2004 (BSU Sophomore/Junior)	38%	33%	29%	100%
<b>Norm Group (Sophomores)</b>	24%	31%	45%	100%
Mathematics Level 1				
2001 (BSU Entering Freshmen)	47%	33%	20%	100%
2004 (BSU Sophomore/Junior)	66%	23%	11%	100%
<b>Norm Group (Sophomores)</b>	55%	28%	17%	100%