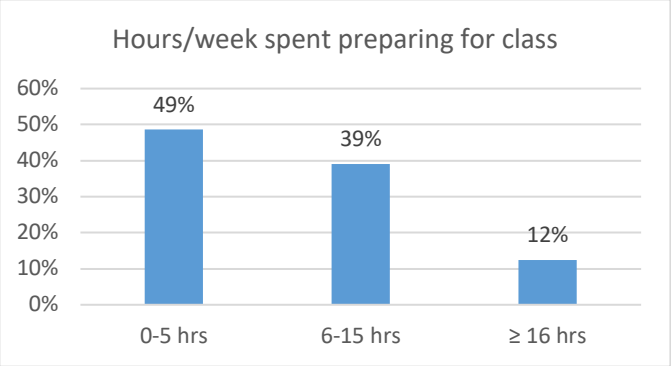
From: Charlie Blaich & Kathy Wise
To: HEDS Members
Date: 2/5/24 (revised 2/13/24)[1]
RE: Institutional Readiness for Incoming Students

Last fall, we created an optional module for the HEDS New Student Survey[2] in which we asked incoming, first-year students a few questions about the work they did in high school. Our goal in asking these questions was to help institutions make sure that their first-year courses, programs, and experiences align with the skills and experiences of their incoming students. We created this module based on the misalignment we've seen at institutions in recent years between how students described the skills and knowledge they bring to college and the assumptions that people at institutions make about the skills and knowledge that incoming students bring with them.

Below, we've briefly summarized the responses from roughly 2,900 students at 13 institutions to the questions in the Institutional Readiness for Incoming Students module.[3] First, we show summary data for each question in the module. We conclude with a discussion of the implications of these data for ensuring that we are meeting our new students where they are, helping them understand our expectations for college-level academic work, and thereby increasing the chance for all our students to succeed.

M1. During your last year of high school, how many hours per week, on average, did you spend studying, doing homework, or preparing for classes?

- ☐ 0 hours
- ☐ 1–5 hours
- ☐ 6–10 hours
- ☐ 11–15 hours
- ☐ 16-20 hours
- ☐ 21-25 hours
- ☐ 26+ hours



Additional findings:

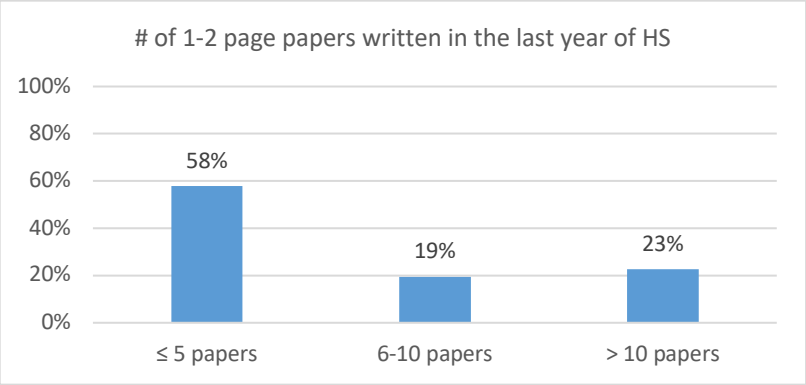
1. We didn't see any relationship between students' reports on how much time they spent studying, doing homework, and preparing for class in high school and students' concerns about how well they'll do in college.[4] Students who studied 5 hours or less a week were no more concerned about doing well in college than students who studied much more in high school.

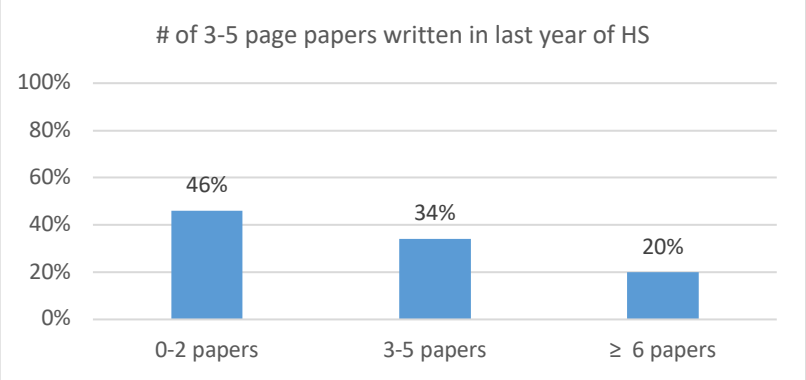
[1] Small revision of the effect sizes we report on page 7 because we tuned how we combined racial/ethnic identities (see updated data on page 10) and corrected one typo in our first report. These updates had no impact on our findings or our conclusions.
[2] https://www.hedsconsortium.org/heds-new-student-survey/
[3] For more information about the students who took this module, please see Appendix 1.
[4] *r=0.04*

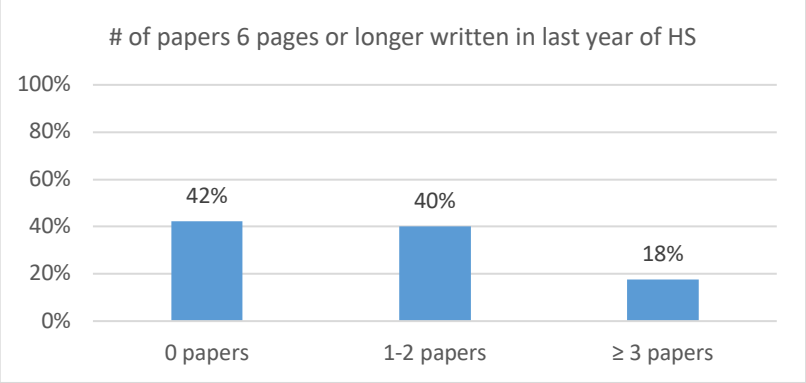
2. One reason that students who study less in high school aren't worried about doing well in college is that *they plan* to study more in college. For example, 70% of the students who said they studied 0-5 hours a week in high school planned to spend more time each week studying in college. Of course, there are two challenges with this data point. First, it means that 30% of the students who spent a minimal amount of time studying in high school intend to continue those study habits in college. Second, do students who've spent no more than an hour a day studying in high school know *how* to study well enough that increasing their study time in college will pay off?

M2. During your last year of high school, about how many papers of the following lengths did you write for your classes?

	I didn't write any papers of this length	I wrote **1-2** papers of this length	I wrote **3-5** papers of this length	I wrote **6-10** papers of this length	I wrote **more than 10** papers of this length
1-2 pages long	☐	☐	☐	☐	☐
3-5 pages long	☐	☐	☐	☐	☐
6 pages or more	☐	☐	☐	☐	☐

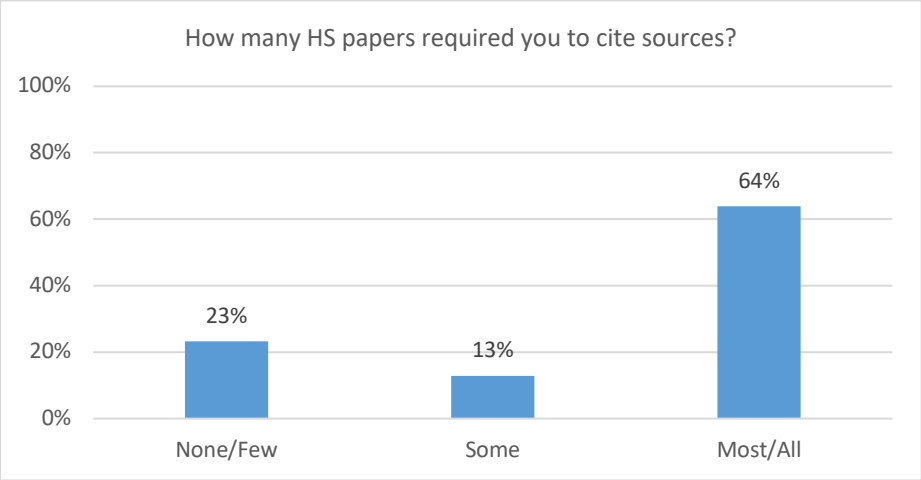






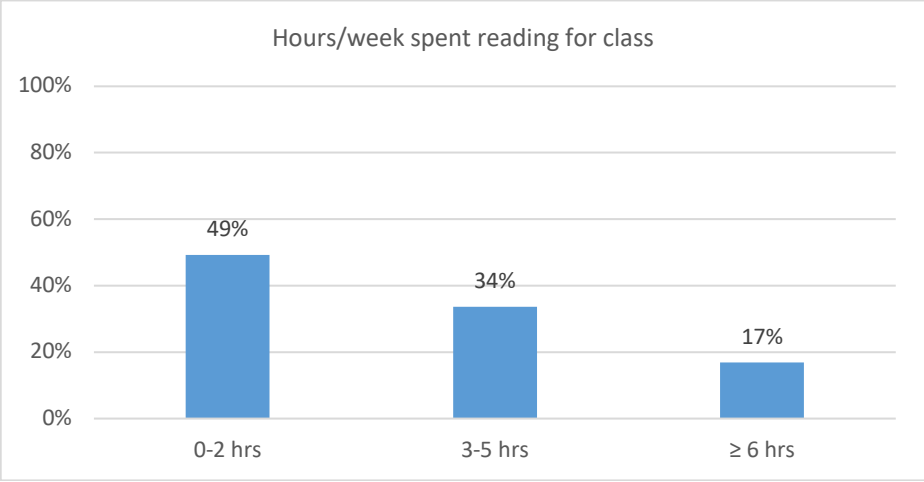
M3. How many of these papers required you to cite sources in a bibliography, references, or works cited list?

- ☐ None
- ☐ A few
- ☐ Some
- ☐ Most
- ☐ Almost all or all



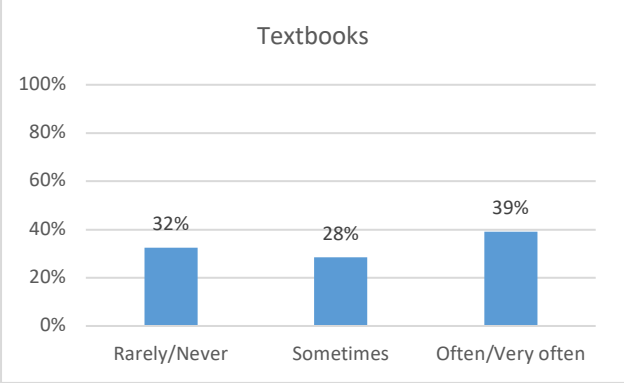
M4. During your last year of high school, how many hours per week, on average, did you spend <u>reading</u> for your classes?

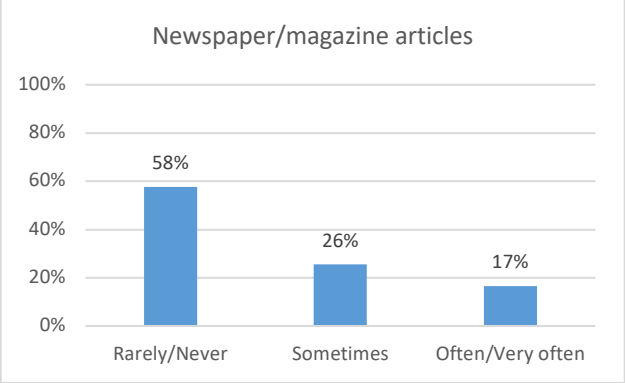
- ☐ 0 hours
- ☐ 1–2 hours
- ☐ 3–5 hours
- ☐ 6–8 hours
- ☐ 8–10 hours
- ☐ 11+ hours

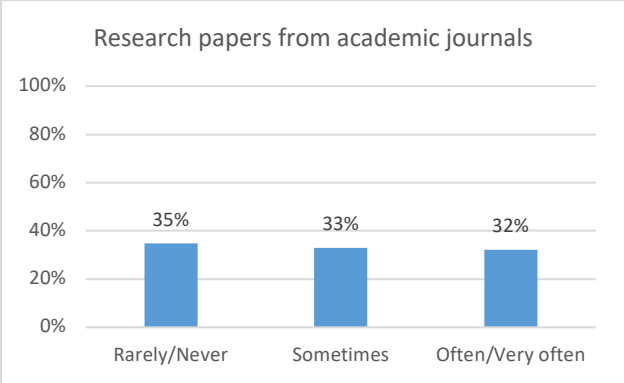


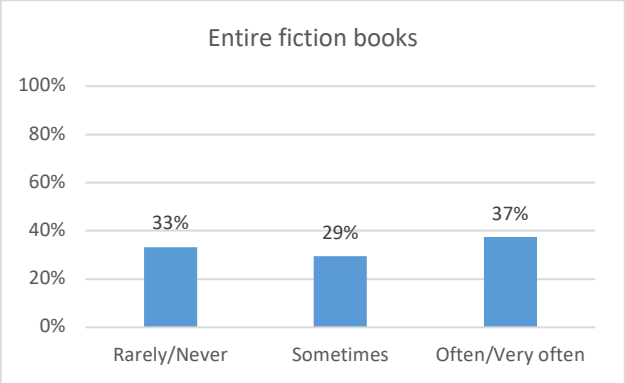
M5. How often did you read the following types of materials (online or print) for class during your last year of high school?

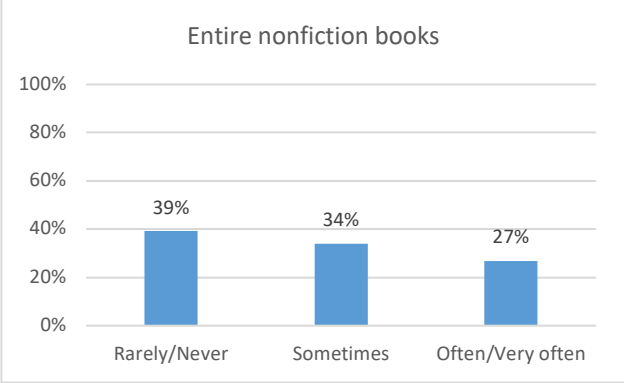
	Very often	Often	Sometimes	Rarely	Never
Textbooks	☐	☐	☐	☐	☐
Newspaper or magazine articles	☐	☐	☐	☐	☐
Research papers from academic journals	☐	☐	☐	☐	☐
Entire fiction books	☐	☐	☐	☐	☐
Entire nonfiction books	☐	☐	☐	☐	☐





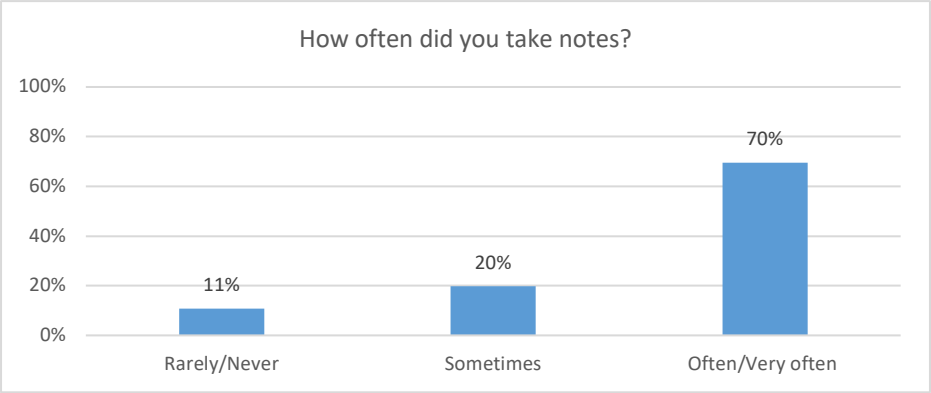






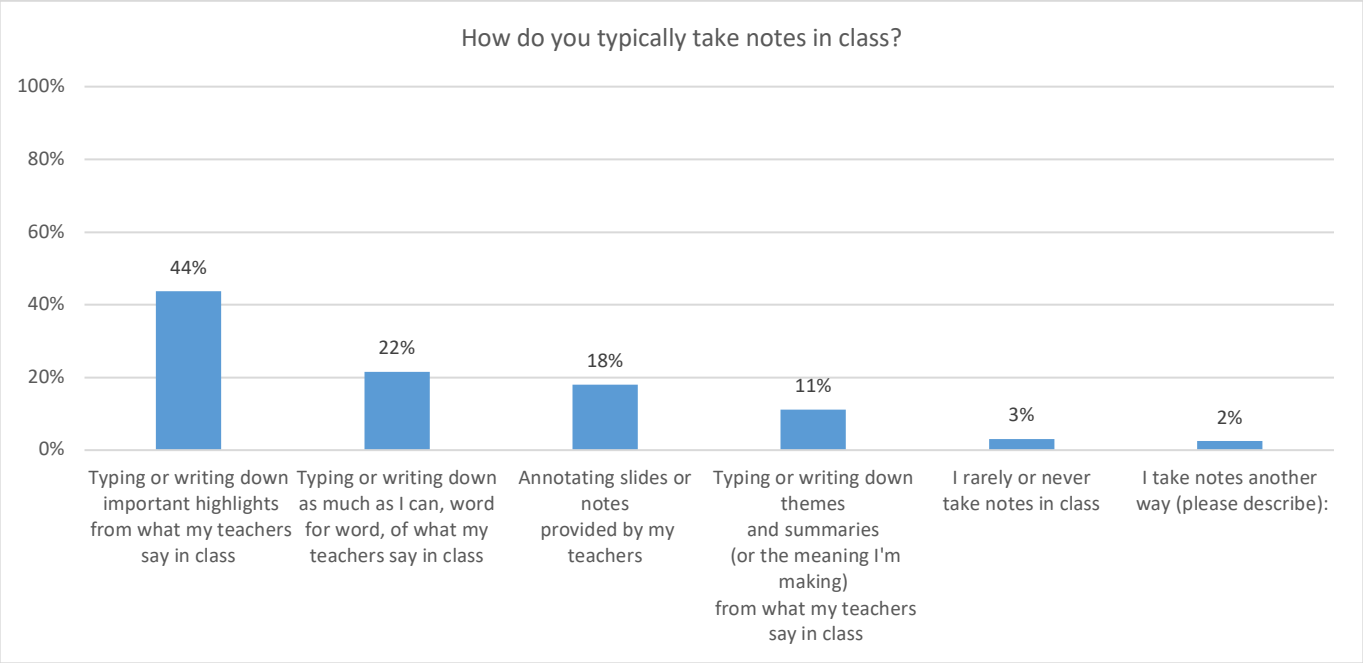
M6. During your last year of high school, how often did you have to take notes in your classes in order to be successful?

- ☐ Very often
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never



M7. Which of the following best describes the way you typically take notes in class?

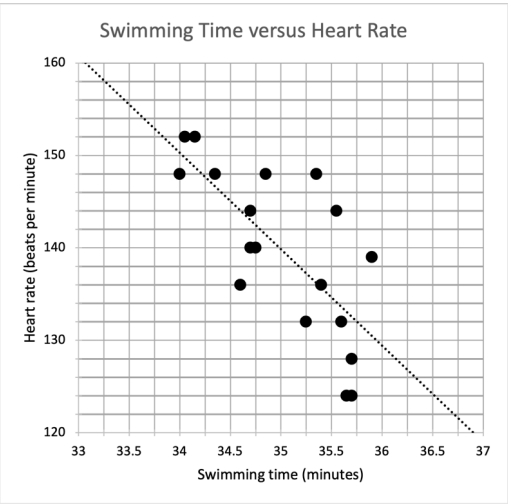
- ☐ Annotating slides or notes provided by my teachers
- ☐ Typing or writing down as much as I can, word for word, of what my teachers say in class
- ☐ Typing or writing down important highlights from what my teachers say in class
- ☐ Typing or writing down themes and summaries (or the meaning I'm making) from what my teachers say in class
- ☐ I rarely or never take notes in class
- ☐ I take notes another way (please describe): _____



M8. Depending on the major you choose or the courses you take, you may see math problems like those below. Do you know how to correctly answer the following problems?[5]

Students chose one of the following response options for each math problem:

- ☐ Definitely yes
- ☐ Probably
- ☐ Maybe
- ☐ Definitely no

Math Problem	Students' Responses	
Solve for x: $\frac{2}{5}(15-10x)-\frac{3}{8}(24-16x)=\frac{4}{3}(3x-21)$	Probably/Definitely yes Maybe/Definitely no	63% 37%
Solve for x: $-2x+4\geq 3$	Probably/Definitely yes Maybe/Definitely no	83% 17%
Solve for x: $\left(16^{\frac{1}{2}}\right)^{3}=x$	Probably/Definitely yes Maybe/Definitely no	68% 32%
Solve for x: $log_3\ 81=x$	Probably/Definitely yes Maybe/Definitely no	56% 44%
A box measures 3.12 ft in length, 0.0455 yd in width, and 7.87 inches in height. What is its volume in cubic centimeters?	Probably/Definitely yes Maybe/Definitely no	67% 33%
Pat swam 2,000 yards a day for 18 days. The scatterplot below shows her swim time for and corresponding heart rate after each swim. It also shows the line of best fit for the data. For the swim that took 34 minutes, Pat's actual heart rate was about how many beats per minute less than the rate predicted by the line of best fit?  	Probably/Definitely yes Maybe/Definitely no	63% 37%

[5] For answers to these math problems, please see Appendix 2.

Additional findings

To learn about how students' identities are related to their experiences with academic work in high school and their confidence about correctly answering the math questions in the module, we created the following indicators[6]:

- *High School Academic Effort Indicator*: This indicator combines students' responses to the 11 questions about study time, reading, and writing into a single score.
- *Math Confidence Indicator*: This indicator combines students' responses to the 6 questions about the math problems into a single score.

Students' Identities and High School Academic Effort

- Gender: Men reported notably *less* effort on studying, reading, and writing in high school than either women or non-binary students (Cohen's $d = 0.29$ and 0.25 respectively).
- Race/ethnicity: International students reported notably *more* effort on studying, reading, and writing in high school than students who we categorized as U.S. White or U.S. People of Color (Cohen's $d = 0.50$ and 0.47 respectively).
- First-generation status: First-generation students reported slightly *less* effort on studying, reading, and writing in high school than continuing generation students (Cohen's $d = 0.13$).
- Pell Grant status: Students who received Pell Grants reported slightly *less* effort on studying, reading, and writing in high school than students who did not receive Pell Grants (Cohen's $d = 0.11$).

Students' Identities and Math Confidence

- Gender: There was no difference in the confidence levels expressed by men, women, and non-binary students about whether they could successfully solve the math problems.
- Race/ethnicity: International students expressed the highest level of confidence in being able to solve the math problems. They were notably *more* confident than both students we categorized as U.S. White and U.S. People of Color (Cohen's $d = 0.43$ and 0.70 respectively).
- First-generation status: First-generation students were notably *less* confident in their ability to solve the math problems correctly than continuing generation students (Cohen's $d = 0.41$).
- Pell Grant status: Students who received Pell Grants were somewhat *less* confident in their ability to solve the math problems correctly than students who did not receive Pell Grants (Cohen's $d = 0.25$).

Summary

What we see in these data align with what students at a range of institutions have been telling us in our focus groups about the kind of academic work they've done in high school and the confidence they have in their ability to correctly solve algebra problems. We were not surprised by the fact that men report expending less academic effort in high school than women or students who identify as non-binary.[7] We also noted important differences in math confidence related to race/ethnicity and socio-economic status that we should be mindful of as many institutions in HEDS are matriculating students with a wider range of pre-college academic experiences.

We used the word "confidence" when we named the second indicator for a reason. In our conversations with first-year students about challenges they were facing in their classes, many of them stretched to remember the last time they'd used the math skills that they were being asked to use in some of their introductory courses. They'd done the kinds of problems that we included in our module, but they hadn't done them in a while, and they weren't confident they could do them correctly.

[6] For more information about these indicators, please see Appendix 1.
[7] For example, Workman, J. & Heyder, A. (2020) Gender achievement gaps: the role of social costs to trying hard in high school, *Social Psychology of Education*, *23*, 1407-1427. https://doi.org/10.1007/s11218-020-09588-6

We suggest that rather than talking about what students have learned in high school, we should use the phrase "what students have learned, retained, and committed to practice" in high school. Most students enter college having successfully completed their assigned readings, written the papers they were asked to write, and solved math problems in algebra, pre-calc, and calculus. But successfully doing these things in high school doesn't mean that they've practiced them with the intensity that we expect in college classes or even that they've done some of these academic tasks in their last months of high school. Some of the students we've spoken with told us that their senior year of high school required less work than their junior year.

As faculty set up syllabi for their first-year classes, it may be worth asking, "When's the last time the majority of my first-year students had to read 50 pages of text, study an hour or two outside of class for each hour of class, review and consolidate their notes after class, solve for x, or use exponents?" Consider the following data points from the HEDS New Student Survey:

- Roughly 90% of students who reported spending five or fewer hours per week studying, doing homework, or preparing for class during their senior year in high school characterized themselves as hard workers.[8]
- Nearly 20% of students who characterized themselves as hard workers planned on spending 5 or fewer hours per week studying, doing homework, or preparing for class in college.

Our sense is that many students are simply continuing practices that have, so far in their academic careers, supported their success. Some of them have been warned about how hard college will be, but they have the habits they have. How many poor grades will it take before they figure out they haven't been doing college-level work? And since college faculty typically give far less frequent and prompt feedback than students got in high school, how far will students get into their first term, or year, before they realize they need to change their work habits? And even after they discover that they need to do so, will they know how to change beyond "just trying harder"?

It doesn't have to be this way. We can do things so that students don't learn what we expect from them based on negative experiences. Given the data from the New Student Survey and the things we've heard in our many conversations with students at colleges across the country, we believe it's worth considering the following questions:

- When and how can we explain to students what we mean at our institutions by "college-level work,"
- How can we build their knowledge, skills, and habits to meet that expectation, and
- What changes do we need to make to our classes, programs, and academic support structures to meet our incoming students where they are and better prepare them to be successful in college?

And we don't mean asking these questions in abstract ways. We mean that faculty who teach first-year students, coaches, academic support staff, advisors, and everyone else who interacts with first-year students should ask themselves:

- How have I taught my students what close reading means and how to do it?
- How have I described to my students how I assume they'll take notes in class? Can I provide examples of good notes or give my students an outline at the beginning of class that they can fill in with the key points from that class?
- How have I explained what studying well looks like and how long it should take?
- How have I talked about how to effectively annotate and highlight text?

[8] We categorized students as "hard workers" if they responded to the question "How much does the following statement apply to you? I am a hard worker" by selecting "Mostly like me" or "Very much like me."

- How have I helped my students, who may have never written anything longer than a two-page paper, understand how to write something longer for my class?
- How can I encourage my students to use academic resources at my institution like tutors, supplemental instruction, or a learning resource center?
- Would it be worthwhile to spend a couple of classes reviewing some fundamental skills that I assume my students learned in high school but may have faded in the months since they last practiced them?

We conclude with a story from a first-year class we taught years ago. It was a "classic" first-year course that combined semi-interdisciplinary content with advising and other traditional "welcome to college" activities. We were talking about friendship in our section of the class, and we'd asked students to read a *very short* section of Aristotle's *Nicomachean Ethics*. Wouldn't you know, when we started our discussion of the reading, we were met with eyes turned downward and silence. "Did you have a chance to read the assignment?" we asked. The students said they did, but they just didn't get it. Fortunately, it was a small class and a short reading, so we broke students into groups and asked them to work together to go through the reading and figure out what Aristotle was trying to say. One student seemed especially stuck and frustrated, so we sat down with him and asked him to read the first sentence of the reading aloud. He did so. Then we asked him to think about what it meant. He thought about it and gave a good explanation. Then we asked him to read the next sentence and repeated our same question. Once again, he got it. We worked through the first paragraph sentence-by-sentence, and then asked him to summarize the main idea of the paragraph. Once again, he did a great job. And after he finished summarizing the paragraph, he said with surprise, "Oh, so I should take my time, and stop and go back and read it again when I don't get something? Huh!" He thought that reading an assignment meant passing his eyes over all the words, from start to finish in one fell swoop, whether or not the material made sense. In his mind he was completing the assignment, and he had no idea that a short, dense reading might take as long to complete, with understanding, as a longer, easier reading.

Here's the thing. We knew that Aristotle is hard to read. We think he's hard to read. That's why we only assigned a couple of pages that included just a few key points. We wanted to help our students develop their ability to read difficult texts. We were scaffolding! But our scaffold didn't work because we assumed that the students in our class had developed a habit that we took for granted. What if, out of frustration, we hadn't asked the class to form groups and go through the reading again? What if we hadn't noticed the frustration of this one student, worked with him, and then after seeing how he was reading the text, talked with the class about close reading? How far would we have gotten into the semester before we figured out that some of our students weren't doing well in our class, and maybe other classes, because they hadn't learned to read and think about what they were reading in the ways we expected? In this instance, fortunately, we figured out our mistaken assumption. But it could just as easily have gone the other way, and we could have continued blissfully ignorant to the fact that many of our students were "reading" assignments without understanding much of what they'd read.

In a world in which our incoming students (and their high school teachers) have faced changing state and local mandates, COVID, and a host of other factors, it's worth asking, "What are we mistakenly taking for granted about what our students have learned, retained, and committed to practice?" We encourage you to join us in asking this question, and we'd love to hear what you learn from your inquiries.

Appendix 1

Information about Respondents

A little over 2,900 students from 13 institutions completed at least one question on the Institutional Readiness for Incoming Students Module. Five of the institutions are Baccalaureate Colleges, six are Master's Colleges & Universities, and two are Doctoral/Professional Universities. In addition:

- In terms of gender, 58% of the survey respondents identified as women, 39% as men, and 3% said they are non-binary.
- Based on their responses to our questions about racial and ethnic identity, we categorized 62% of the respondents as U.S. White, 31% of the respondents as U.S. People of Color, and 7% as International students.
- A quarter of the students reported that they'd received a Pell Grant.
- Based on their responses to our question about their parents' or guardian's education, we categorized 45% of the students as first-generation college students.

High School Academic Effort Indicator

To calculate the High School Academic Effort Indicator,[9] we summed each student's responses to the following 11 questions:

M1. During your last year of high school, how many hours per week, on average, did you spend studying, doing homework, or preparing for classes?

- 0 hours = 1
- 1–5 hours = 2
- 6–10 hours = 3
- 11–15 hours = 4
- 16–20 hours = 5
- 21–25 hours = 6
- 26+ hours = 7

M2. During your last year of high school, about how many papers of the following lengths did you write for your classes?

- Sub-Question 1: 1-2 pages long?
- Sub-Question 2: 3-5 pages long?
- Sub-Question 3: 6 pages or more?

Students received the following scores for their responses to each of the three sub-questions about papers of different lengths:

- I didn't write any papers of this length = 1
- I wrote 1-2 papers of this length = 2
- I wrote 3-5 papers of this length = 3
- I wrote 6-10 papers of this length = 4
- I wrote more than 10 papers of this length = 5

[9] Cronbach's $\alpha = 0.74$

M4. During your last year of high school, how many hours per week, on average, did you spend reading for your classes?

- 0 hours = 1
- 1–2 hours = 2
- 3–5 hours = 3
- 6–8 hours = 4
- 8–10 hours = 5
- 11+ hours = 6

M5. How often did you read the following types of materials (online or print) for class during your last year of high school?

- Sub-Question 1: Textbooks
- Sub-Question 2: Newspaper or magazine articles
- Sub-Question 3: Research papers from academic journals
- Sub-Question 4: Entire fiction books
- Sub-Question 5: Entire nonfiction books

Students received the following scores for their responses to each of the five sub-questions about different kinds of texts.

- Never = 1
- Rarely = 2
- Sometimes = 3
- Often = 4
- Very often = 5

M6. During your last year of high school, how often did you have to take notes in your classes in order to be successful?

- Never = 1
- Rarely = 2
- Sometimes = 3
- Often = 4
- Very often = 5

Math Confidence Indicator

To calculate the Math Confidence Indicator,[10] we summed each student's responses to the six math problems listed in question M8 in this report using the following scoring scheme:

- Definitely no = 1
- Maybe = 2
- Probably = 3
- Definitely yes = 4

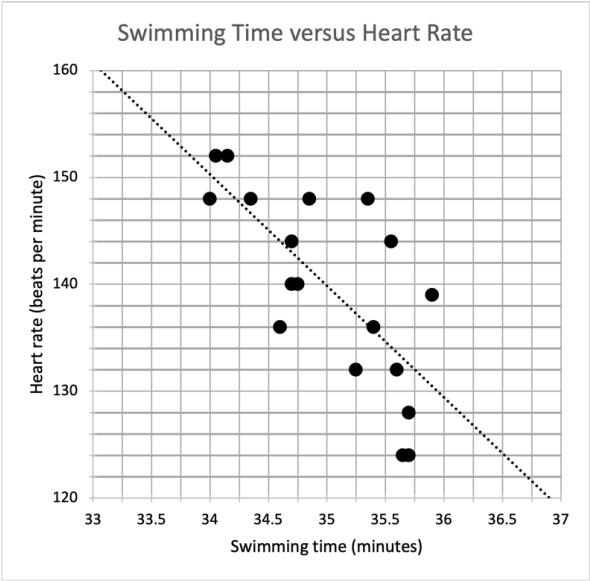
[10] Cronbach's $\alpha = 0.85$

Appendix 2

Answers to the math problems in the survey.

Math Problems	**Answers**
Solve for *x*: $\frac{2}{5}(15-10x)-\frac{3}{8}(24-16x)=\frac{4}{3}(3x-21)$	$x=\frac{25}{2}=12.5$ See steps below: $\frac{2}{5}(15-10x)-\frac{3}{8}(24-16x)=\frac{4}{3}(3x-21)$ Multiply the fractions times the equations in brackets. $\left(\frac{30}{5}-\frac{20x}{5}\right)-\left(\frac{72}{8}-\frac{48x}{8}\right)=\left(\frac{12x}{3}-\frac{84}{3}\right)$ Simplify by dividing by the denominators of the fractions $(6-4x)-(9-6x)=(4x-28)$ Get rid of the brackets. $6-4x-9+6x=4x-28$ Simplify the left side of the equation. $2x-3=4x-28$ Simplify by combining like terms. $-3+28=4x-2x$ $25=2x$ Divide both sides by 2. $\frac{25}{2}=\frac{2x}{2}$ $\frac{25}{2}=x$
Solve for *x*: $-2x+4\geq 3$	$x=\left(-\infty,\frac{1}{2}\right]$ Subtract 4 from both sides of $-2x+4\geq 3$ to get $-2x\geq -1$. Then divide both sides by -2 and switch the direction of the inequality to get $x\leq\frac{1}{2}$. Thus, the solution set is the interval $\left(-\infty,\frac{1}{2}\right]$.

Math Problems	Answers
Solve for *x*: $\left(16^{\frac{1}{2}}\right)^3 = x$	$x = 64$ An exponent of $\frac{1}{2}$ is a square root. So $16^{\frac{1}{2}} = \sqrt{16} = 4$ And $4^3 = 4 * 4 * 4 = 64$
Solve for *x*: $log_3\ 81 = x$	$x = 4$ If *x* and *b* are positive real numbers and *b* does not equal 1, then $log_b\ x = y$ is equivalent to $b^y = x$ Thus, $log_3\ 81$ is equivalent to $3^x = 81$ and $x = 4$ because $3^4 = 3 * 3 * 3 * 3 = 81$
A box measures 3.12 ft in length, 0.0455 yd in width, and 7.87 inches in height. What is its volume in cubic centimeters?	The volume of the box is 7915 cm^3. The volume of a box is calculated as V = L x W x H. First, you have to convert all the dimensions to the same unit, such as inches. $x\ in = 3.12\ ft\left(\frac{12\ in}{1\ ft}\right) = 37.44\ in$ $x\ in = 0.0455\ yd\left(\frac{3\ ft}{1\ yd}\right)\left(\frac{12\ in}{1\ ft}\right) = 1.638\ in$ V = 37.44 *in* x 1.638 *in* x 7.87 *in* = 483 in^3 (rounded to the nearest cubic inch) Note, the question is asking for cm^3. The conversion from *in* to *cm* is: $\frac{2.54\ cm}{1\ in}$ To convert in^3 to cm^3: $\left(\frac{2.54\ cm}{1\ in}\right)^3 = \left(\frac{2.54^3\ cm^3}{1\ in^3}\right)$ Therefore, $x\ cm^3 = 483\ in^3\left(\frac{2.54^3\ cm^3}{1\ in^3}\right) = 7915\ cm^3$ (rounded to the nearest cubic centimeter)

Math Problems	Answers
Pat swam 2,000 yards a day for 18 days. The scatterplot below shows her swim time for and corresponding heart rate after each swim. It also shows the line of best fit for the data. For the swim that took 34 minutes, Pat's actual heart rate was about how many beats per minute less than the rate predicted by the line of best fit?  	Answer = 2 beats per minute From the graph, Pat's actual heart rate for the 34-minute swim was 148. The line of best fit predicts a heart rate of 150 for a swim of this length. Difference between predicted and actual = $150 - 148 = 2$