

Performance and Challenges in the Core  
Core Review Planning Team (CRPT) Community Meeting  
4:15 pm, October 20, 2017

Core Curriculum Director Tom Donnelly thanked everyone for coming to the second CRPT community meeting on the Core. He explained that the CRPT was trying to be very transparent and thus he noted they would be giving a slightly different presentation from the one that was given to the faculty yesterday. The CRPT will present data, and then there will be breakout sessions with quick reports out to the whole group.

Marissa Lee '18, ASHMC Senate Chair, presented for the CRPT on performance, challenges, and workload in the Core. She noted that she would be sharing data on how many students struggled in Core courses, and where they struggle. She would also present a “worked-hard/learned-a-lot” rubric for every core course as well as “How often...did you have enough time to pursue interests outside of class and homework?” data broken down by semester in Core

She recalled that at the first meeting, the CRPT presented three goals for the Core that emerged as the top responses in a survey of all community members. Those goals are:

- 1) Inspiring in students a sense of curiosity and excitement about what is possible in a discipline,
- 2) Building interdisciplinary facility (e.g., equipping students to engage across disciplinary boundaries),
- 3) Providing a "technical toolkit" that acts as a foundation for advanced study in STEM.

She then recalled that participants at that first meeting were invited to comment on what they thought those three goals missed. The CRPT distilled those reactions and again ended up with three things:

- 1) The three goals are too broad and invite a new and different “firehose,”
- 2) The Mission statement and impact of work on society and social engagement are missing,
- 3) We need to explicitly call for the construction of a Core that is inclusive and supportive of all students.

It was recalled that the term "firehose" has been used to describe a problem in the Core where by its hard to get anything because there is so much coming at you. It is like trying to "drink from a firehose."

Marissa Lee '18 turned to the questions of how many students struggle in the Core and how deeply do they struggle? She explained that "struggling" was defined as getting a D+, D, F, or

NC in a course and said that the data were limited to first time full time HMC students. This means no part-time, no HS students, no transfer students, and no exchange students. The data are organized by entering cohort year (2010-2016) and because we are looking retroactively, we are losing a little bit of information about struggle, because grades of IP and INC are turned into final grades. Of the 1426 people who passed through the Core in the cohorts from 2010 to 2016, 342 or 24% struggled in at least one course. She then displayed a graph showing the percentage of students who struggled in one, two, three, four, five, six, and seven or more courses. 148 struggled in exactly one course, which is 10% of the population (148/1426). Half that number struggled in two courses and it fell even further from there. She then displayed a graph showing the percentage of those 342 who struggled in one to 12 courses. Of the 342 students who struggled in at least one course, the majority 42% (148 students) struggled in exactly one course, 20% (71 students) students struggled in two courses, 14% (49 students) struggled in three courses. The remainder struggled in four to nine courses. No one in the sample struggled in 10 or more courses.

Next, she displayed a graph showing the number of students who struggled in each Core course. She explained that because there is limited time today and the CRPT wanted to stay focused on the issue of struggle, they did not identify the courses by name on this graph. Courses will be names in the results that will be posted to the CRPT website. She noted that interpretation of the graph was complicated by the fact that not all courses are taken by all students. For example, some courses have been redesigned (E59 vs E79, Chem 23D, E, and S vs Chem 23A and B), some depend on placement tests (Math 30 B&G, CS5/CS42,/CS5GR, Physics 24/24A), some are not taken unless deemed necessary (Writ 1E), and some can be placed out of.

Four courses had more than 10% of students who took it struggle in it:

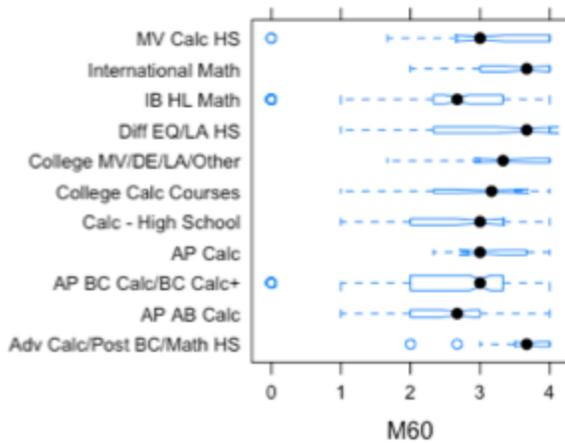
- Course A 15% of students struggled
- Course B 12% of students struggled
- Course C 10% of students struggled
- Course D 12% of students struggled

Every other course was below 10%.

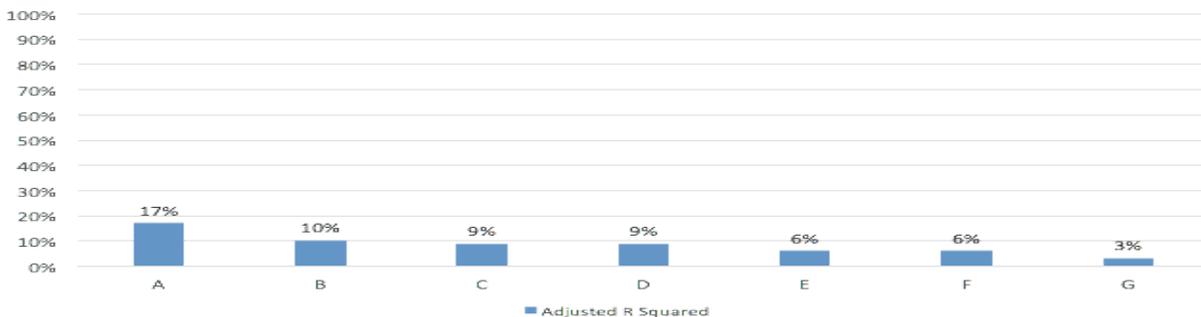
Marissa Lee '18 then turned to talking about the relationship between student characteristics and performance in the Core. The first thing examined was the highest level high school class in Chemistry, Physics, and Mathematics. The CRPT thanked VP for Admission, Thyra Briggs, for both providing these data and grouping the large number of courses into manageable sets.

She then showed the following box and whisker plot and said that it shows us the distribution of

grades in this class for 2 years of students (cohorts 2014 and 2015) based on the highest level math class they took before arriving at HMC. She explained that the black dot is the median, the blue circles are outliers, the horizontal box represents the middle 50%, the dashed lines are the whiskers, which contain the middle 90%. The zero to four scale is the standard four point grading scale (F=0, D=1, C=2, B=3, A=4). She observed that this visualization allows us to see if high school preparation is a factor in grades in Core courses. The CRPT has similar graphs for all Core courses and also did this with race and gender. No significant differences emerged for gender, which is why we have not used it subsequently.



Since student characteristics don't exist in isolation, we used multiple regression to investigate whether race and high school preparation are important predictors of Core grades either separately or in combination. We ran three sets of linear regressions. Entering race, high school preparation, and then both as blocks of independent variables with grades in the 10 graded courses in the Core serving as dependent variables. The full regressions will be posted, but in the interest of focusing on the big picture, this graph shows the amount of variance accounted for in the full model for the 7 courses where it was significant.



Course	Adjusted R2	Significance of Full Model
Chem 23A	17%	p<.001
Chem 23D	9%	p<.01
Math 40	6%	p<.01
Math 45	9%	p<.001
Math 60	10%	p<.001
Math 65	3%	p<.05
Phys 51	6%	p<.01

Models for Chem 24, Phys 24, and Phys 24A were non significant so looking at the amount of variance predicted is not appropriate.

This means that high school preparation and race together count for at most 17% of the variance in grades in core courses. This leaves 83% of the variance unexplained. This is not entirely surprising as there are many other factors that impact grades that we have not accounted for in our model: classroom climate, campus climate, student motivation in the course, course schedule, learning disabilities, fatigue, etc. But what it does underscore is that there is no single magic bullet.

Core Curriculum Director Donnelly said that he was shocked that the models explained so little as he had hypothesized that those who struggled in physics had inferior high school preparation.

Director of Institutional Research and Effectiveness, Laura Palucki Blake said that she was not so shocked because social scientists think about all the variables in the universe--student motivation, the temperature in room, the time of course, etc. She concluded that grades are determined by a lot of things and said that we will not find a single magic bullet.

She was asked if the regression took into account the fact that most students are white. She replied that it did as race was one of the variables in the model.

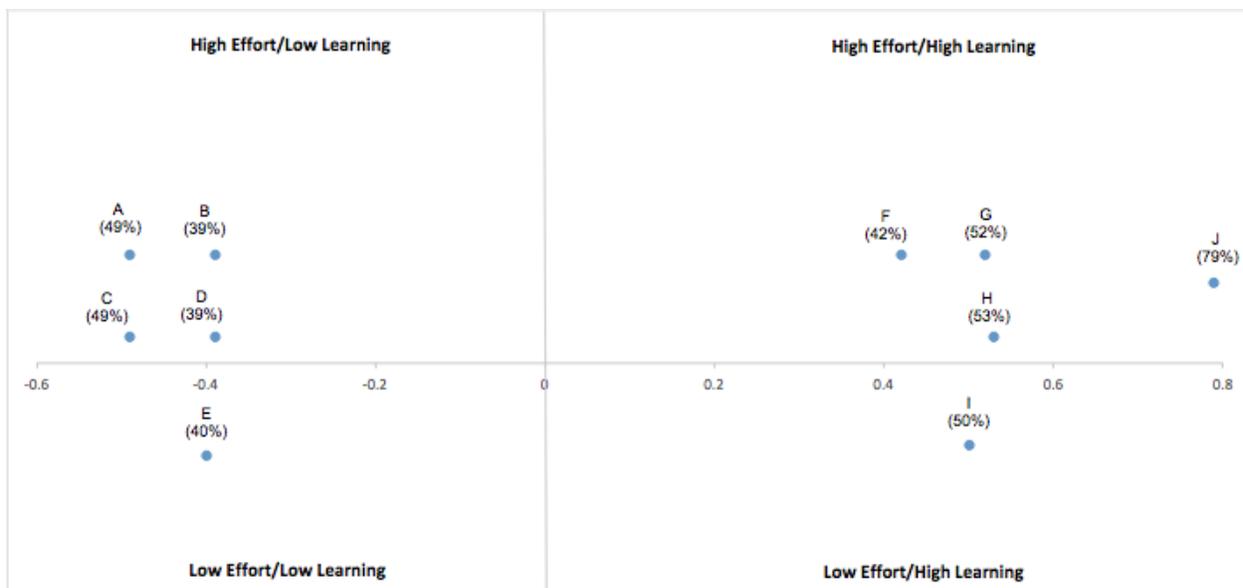
A student requested that statistics be represented in a way that is less process but still anonymized. He said that he did not understand how the CRPT arrived here so I can't accept this as the truth. He noted that social science and statistics have been used before to disproportionately harm some communities and asked for unprocessed data.

Laura Palucki Blake explained that the CRPT structured this presentation to be process orientated and said that it would look at the data in other ways as we look as we move towards implementation.

Marissa Lee '18 then turned to the relationship between effort and learning noting that data for this section came from the survey of students who were asked “how they would characterize their experience overall in the their first semester of course.” They were asked to answer by dragging the name of each course they took into 1 of 4 boxes:

- High Effort/Learned a lot
- High Effort/Learned a little
- Low Effort/learned a lot
- Low Effort/Learned a little

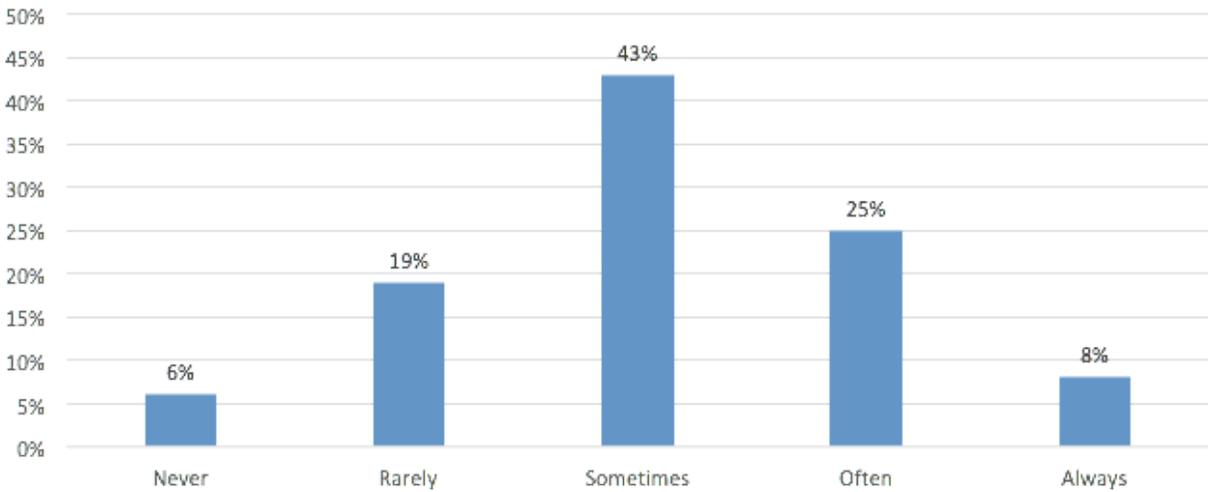
She then displayed a graph showing where students put first semester courses:



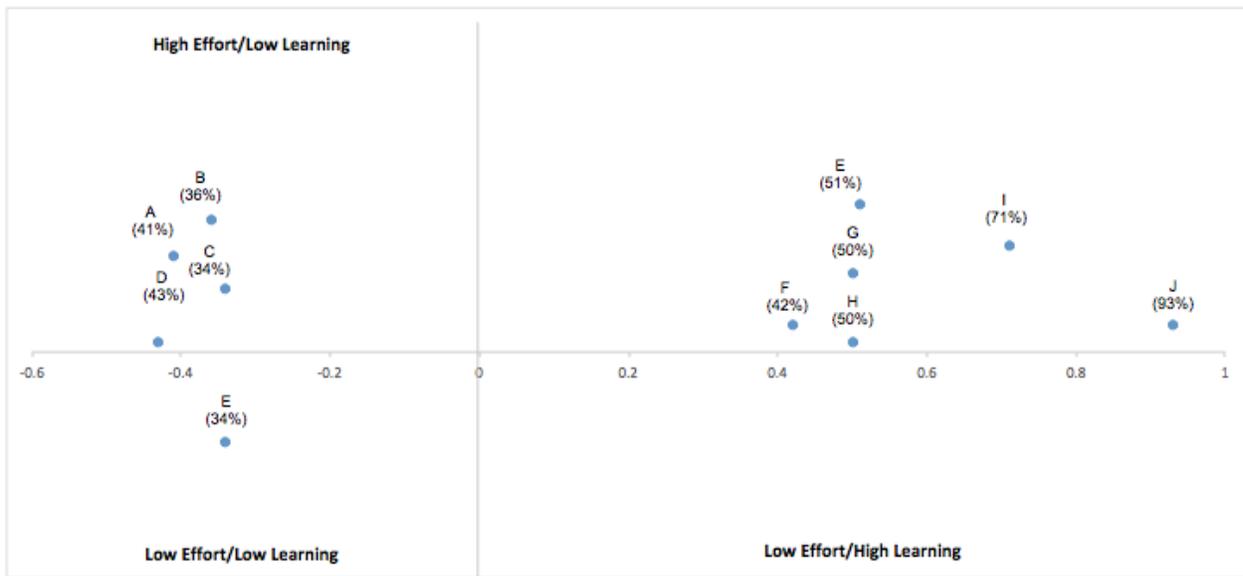
Marissa Lee explained that judgments about effort and learning were made by the respondents themselves. Laura Palucki Blake noted that full survey results are online on the CRPT webpage. It was asked if the letter labels referred to the same courses as they did in the previous charts. The answer was that they do not.

The same survey asked students how often in that semester they had time enough to pursue interests outside of class and homework. A quarter responded "never" or "rarely."

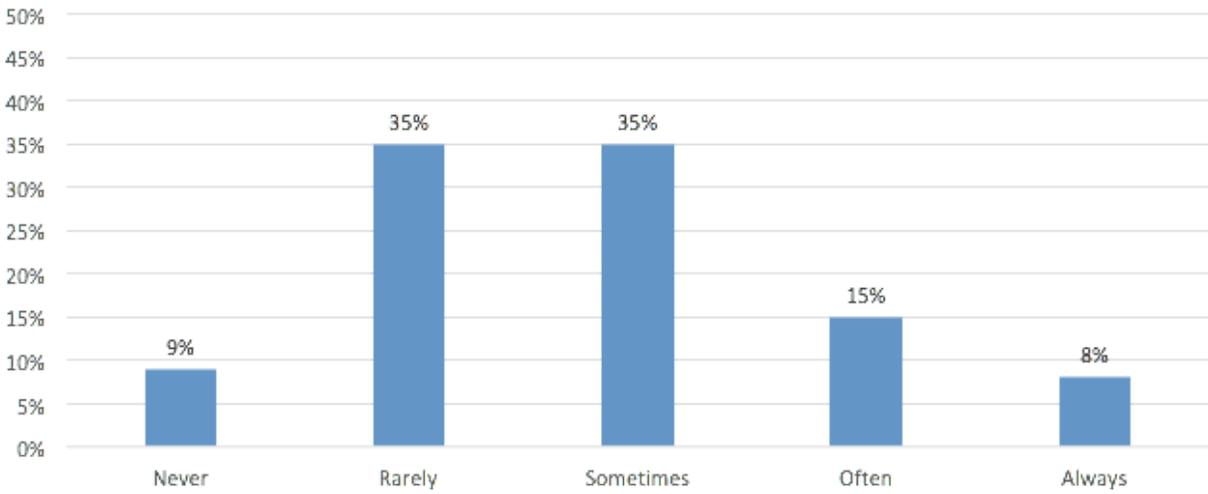
That chart is reproduced here:



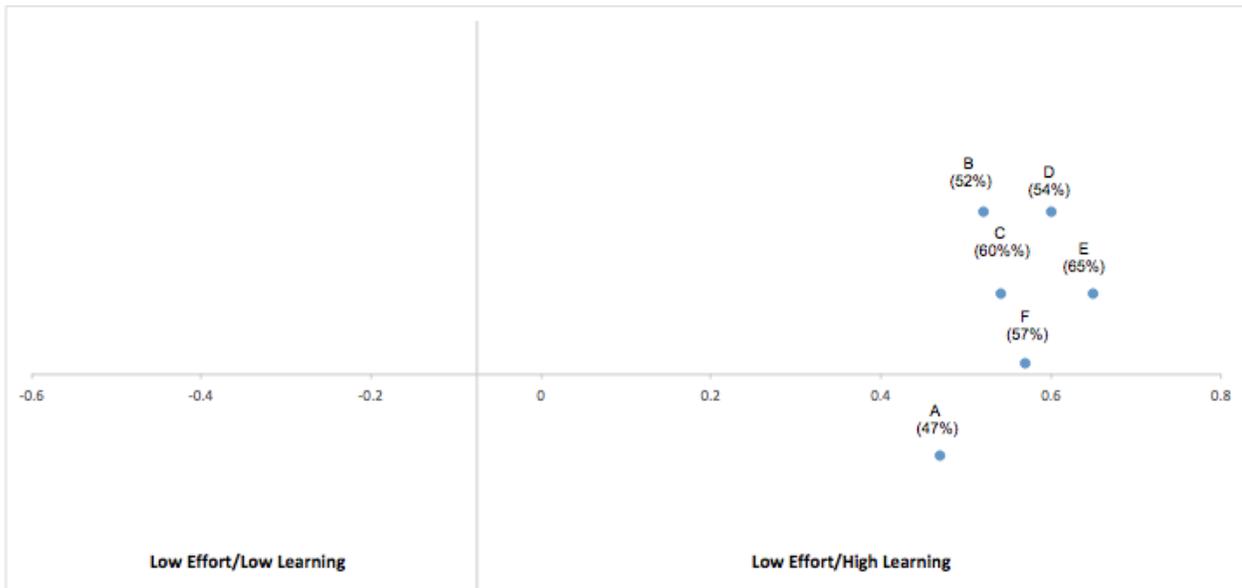
Responses to the question asking students to bin courses by effort and learning continue to show lots of effort in the second semester of Core:



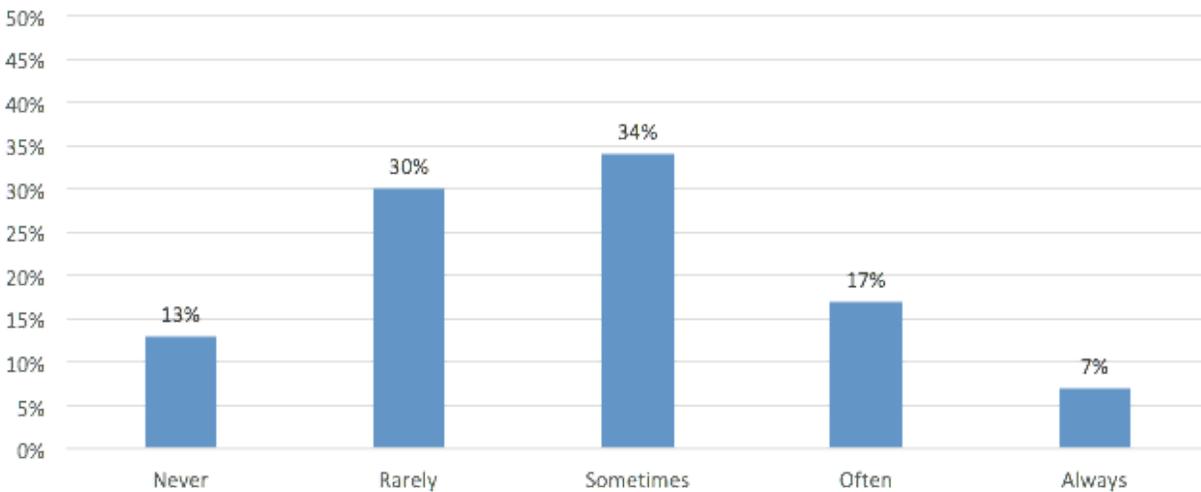
With even less time for outside interests:



In the third semester, students thought they learned a lot in all of their courses:



But few reported having time for non-academic activities:



Participants were then asked to form into two groups and consider the following questions:

- 1) Do these data impact your view of what the goals of our core should be? If so, in what way?
- 2) Should workload be a design principle for the core? If so, how might we regulate it across courses?

When it came time to report out, Tom Donnelly explained that the CRPT had learned from the Caltech consultants that having groups report out everything makes it hard to rank order their statements so each group was asked to list only the things they found to be the most important.

Group 1 questioned the definition of struggling and asked if the student getting two C's would see themselves as struggling since they are used to getting all A's in high school. Group 1 also noted that it looks like there are four courses where students are struggling and suggested that the issue may lie in those four courses. Finally, they asked if high effort were a positive or negative thing.

Group 2 said that they wanted more data to be able to determine the goals of the Core. They also thought that any set of goals that did not explicitly call for the construction of a Core that is inclusive and supportive of all students would be problematic. They also said that workload should be a design criterion for the Core.

Core Curriculum Director Tom Donnelly thanked everyone for their participation.

