October 19, 2017 Core Review Planning Team (CRPT) presentation for faculty

Core Curriculum Director Tom Donnelly called the meeting to order at 12:12. He noted that next week's Faculty Meeting would also be devoted to a CRPT presentation.

CRPT and FEC member, Erika Dyson observed that one purpose of today's meeting was to talk about the data we have collected on students struggling in the Core.

She recalled that at the last meeting, the CRPT presented the convergence on three goals for the Core:
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 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.

The CRPT looked at how many students struggle in the Core and how deeply they struggle.
Struggling in a course was defined as getting a D+, D, F, or NC in it.
Only HMC students were considered.
Only first time full time students were considered. (E.g. no part-time, no HS, transfer, or exchange students.)
Data are labeled for entering cohort year, not academic year (2010-2016)
Because we are looking retroactively, we are losing a bit of information about struggle, because grades of IP and INC have turned into final grades.

352 people of the 1426 who passed through the Core in a cohort from 2010-16 struggled in at least one course. This is 24%.

Erika Dyson then displayed a graph showing how many courses those 24% of students struggled in. 10% of HMC students struggled in only one course. Five percent in two courses, three percent in three courses, two percent in four and five, and one percent in six and seven or more. Of the 342 students who struggled in at least one course, the majority only struggled in one course:

42% (148 students) struggled in exactly one course
20% (71 students) students struggled in two courses
14% (49 students) struggled in three courses

Erika Dyson displayed a graph showing the number of strugglers in 29 different anonymized courses. She observed that not all courses are taken by all students:
Some Courses have been redesigned (E59 vs E79, Chem 23D, E, and S vs. Chem 23A and B),
Students can place out of some courses or into an alternative (Math 30 B&G, CS5/CS42,/CS5GR, Physics 24/24A),
And some are not taken unless deemed necessary (Writ 1E).

Four courses had more than 10% of students who took the course 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

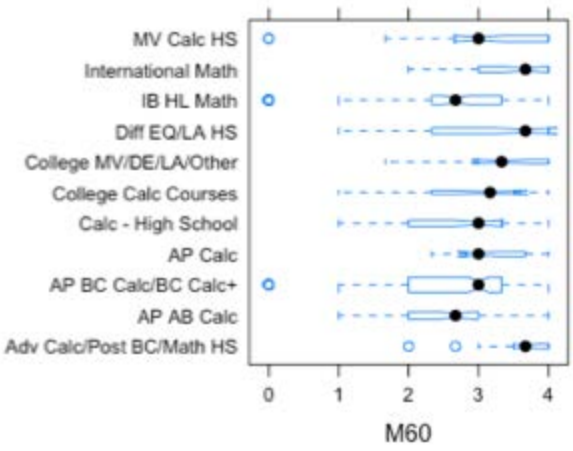
Every other course was below 10%.

She observed that because there is limited time today and they wanted to stay focused on the issue of struggle, they have not identified the courses in these slides, but will in the results that will be posted.

Men and women were equally likely to struggle in one course. Likewise, there were no significant gender differences for the moderate strugglers, but if we look at those who struggled in five or more there is a barely significant ($p=0.497$) difference between the genders with women slightly over represented.

It was asked if this included people who ITRed. The reply was that it did.
The names of the courses will be included in the materials posted online.

Next, CRPT member Ran Libeskind-Hadas talked about the relationship between high school preparation and performance in the Core. He thanked V.P. for Admission, Thyra Briggs, for providing the data showing the highest chemistry, mathematics, and physics courses taken in high school by each student and for grouping the large number of courses into a manageable number of categories.
He then showed a box and whisker plot showing the grade distributions of the students in the cohorts of 2014 and 2015 in Math 60 for each level of high school preparation:

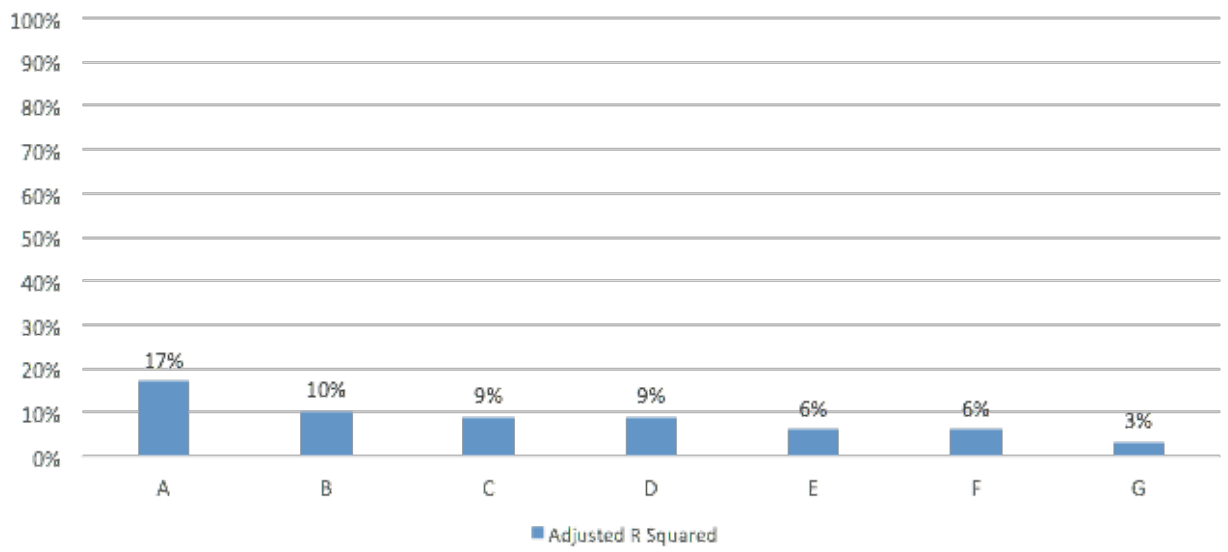


He explained that the black dot is the median, the blue circles are outliers, and the horizontal box represents the middle 50% of the distribution. The taller the box, the more students it represents and the the dashed lines are the "whiskers", which bound the middle 90%. Grades are on the standard 4-point scale (0= F, 1= D, 2= C, 3= B, 4= A).

He noted that these visualisations allow us to see if high school preparation is a factor in grades in Core courses. We have them for all core courses and we did them for race and gender as well as high school preparation. We found nothing significant for gender, which is why we have not used it subsequently.

We know student characteristics don't exist in isolation, so we used 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, HS Prep, and Race X HS prep as blocks with grades in the 10 graded courses in Core serving as dependent variables. We will post the full regressions, so folks can see the full pictures, but in the interest of focusing on the big picture now we have prepared a graph that shows the amount of variance accounted for in the full model for the seven courses where the models were significant.



Course	Adjusted R^2	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

The Models for Chem 24, Phys 24, Phys and 24A were not 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 the difference in grades in core courses, which leaves 83% of the variance unexplained. That is not entirely unsurprising 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.

It was asked if the letter codes for courses were the same for both slides. They are not.

Director of Institutional Research and Effectiveness, Laura Palucki Blake explained that dummy variables coded for race were entered as block 1, the regression run and the explanatory power of the model noted. Dummy variables coded for level of high school preparation were then run as a separate model. Then a third with both blocks of independent variables. Finally, we ran a model with race, HS prep, and the interaction of URM with each course.

Core Curriculum Director Tom Donnelly said that he was surprised to learn that we could only explain 17% of people's performance in a particular Core course. Laura Palucki Blake noted that social scientists are used to low r-squares as people are motivated by multiple influences.

V. P. for Admission Thyra Briggs recalled that each year she prepares a sheet showing the highest course in math and STEM taken by each admit. She noted that at one point there were 142 different names for math courses. She and her staff grouped them into the categories we saw on the graph. It is hard because each school makes up its own course names.

There was a suggestion made to cross disciplines and see how, for example, HS preparation in physics impacts performance in HMC math courses.

It was noted that the relationship of high school preparation to performance on our placement exams was looked at.

It was asked if potential bias in grading was addressed. It was not.

There was then some discussion of possible other variables that could be of interest. Some recalled that Math SAT had previously been found to be a predictor. Thyra Briggs clarified that it was the SAT Math Subject test and not the regular SAT Math. She also noted that there is very little variation on this exam which is taken only by those who are extremely well prepared for it. She noted that while most people who take it get an 800, we did find earlier that those who fell below a threshold level performed less well here than those above it.

Ran Libeskind-Hadas thanked the participants as well as the staff who contributed to the analysis.

The small groups were then asked to consider the questions of:
Do these data impact your view of what the goals of our core should be?
And, if so, in what way?

And then enter their answers on the form on the laptop at their table.