Notes from First CRPT Presentations:
September 14, 2017 Presentation to the Faculty
September 15, 2017 Presentation to the Community

The Core Review Planning Team or CRPT called a meeting of faculty at Noon on September 14, 2017 to review the results of the Core Survey of Alumni, Students, Faculty and Staff. They held a very similar meeting for the HMC Community at 4:15 on Friday, September 15. Because the presentations made were nearly identical, it was decided to produce a combined record but the reports back from the break-out groups are reported separately at the end of this document. The purpose of these meetings was to inform the community about and involve people with, preparing for the program review of the Core.

For the faculty session CRPT member Nancy Lape called the meeting to order saying that the CRPT would be sharing the results of the Core survey at today's meeting. For the community session, this was done by ASHMC Senate President Marissa Lai '18. The speaker recalled that the alumni survey was sent out in July, while the others were sent in the third week of August. All surveys were open for three weeks and asked virtually identical questions. The surveys consisted of four components: experiences in the Core, priorities for elements of the Core, open ended questions, and finally, demographics. Response rates were mostly pretty good: faculty (73%), staff (9%), students (60%), Alumni (25%).

ABOG President David Sonner '80 presented some qualitative results from the alumni survey. He began by talking about the actual history of the Core which he distinguished from an ideal Core. He said that if you ask any alumnus from a few years ago what differentiates HMC from other STEM schools the answer will be that HMC's broad Core results in graduates who are much less specialized than those from most STEM schools. He then asserted that this breadth equips Mudders to get leadership roles early on in their careers because upper managers like to have a generalist in charge because that generalist can fill the gaps left in a team of specialists. He recalled that HMC's founders had experience in engineering in WWII and the early Cold War and saw too much specialization amongst the engineers of the period. They designed the original Core to create leaders for the day. The wide breadth has worked well both for graduates going into industry and and those who pursue graduate study. The Core teaches students to triage their work so that they can meet impossible deadlines. The founders knew that the corporate world would be hard with big jobs and wanted graduates to be ready for it. Mudders are kind of like Marines in that completing the Core makes one a member of an elite community. The Core is the forge that makes students stronger and bonds a class together. He conceded that not all alumni like everything about the Core and hold different opinions about the efficacy of its workload.

Responses to the alumni survey contained over 200,000 words of qualitative comments. David

Sonner '80 displayed a few of those words:

“Mudd graduates are willing and able to take on multiple projects spanning multiple areas of expertise and are able to execute them efficiently with a generally high-quality output. Mudd graduates tend to collect all the projects that slip through the cracks because they don't fit neatly into anyone's ‘area of expertise.’ ”

“The number of silo-ed STEM people I meet from other institutions just depresses me, both on the breadth of their STEM skills, and in the often paltry exposure to the humanities and social sciences.”

“On entering the workforce I was absolutely stunned to find out that people from all sorts of disciplines frequently said ‘I don't do or know X, so I'm not the right person for this’ or otherwise bottled/barricaded themselves in the comfort of their known field … but the place Mudders work best and add the most value is when the answers aren't known, and that's deeply related to the universal Core experience.”

“The Core makes you an asset to your research team or your Company because you will be able to creatively solve problems by borrowing tools and concepts from other fields.”

“[The Core], along with HMC's approach to engineering, gave me a huge advantage in my career over those that had EE or other specialized degrees.”

“The core curriculum gave me the skills I use everyday to communicate with co-workers in other disciplines and to become a technical leader in my field.”

“In my graduate school experience, it became very clear that I had much more experience outside my major than my classmates, even as someone who sometime struggled with the Core. I think this breadth is more important to making Mudders stand out among our peers, even at the expense of some depth.”

“The HMC technical core was the single most crucial aspect of my development at Mudd - and after 20 years in a variety of academic and research environments, my breadth across technical disciplines is easily the most distinguishing feature of what I bring to the table versus peers from other institutions.”

“[The Core] set me up well for industry where I often face basically impossible deadlines but manage to finish enough content, well enough and on time, that I still succeed.”

“One of the main benefits of core was learning how to triage a massive workload for a set period of time. The time management skills, and ability to work very quickly that I developed during core, have been some of the most valuable skills that I acquired at Mudd.”

“The role of Core Curriculum is to prepare a student for whatever technical and leadership challenges that the student may encounter later in life.”

“[The Core] can be overwhelming at times, but its purpose isn't to make students suffer.”

“Having had to work harder than anyone else did as a student has made me bulletproof in my professional life, and supremely confident that I can still make time for personal passions, even when life is busy.”

“The most valuable part of Core for me was being pushed past what I believed I could do, and sharing that experience with all of my classmates. That everyone goes through core also provides universal common experiences with other Mudders from different classes.”

“[The Core] gives you the shared foundation that all Mudders have -- it's like the forge you go through that both makes you stronger and binds you together.”

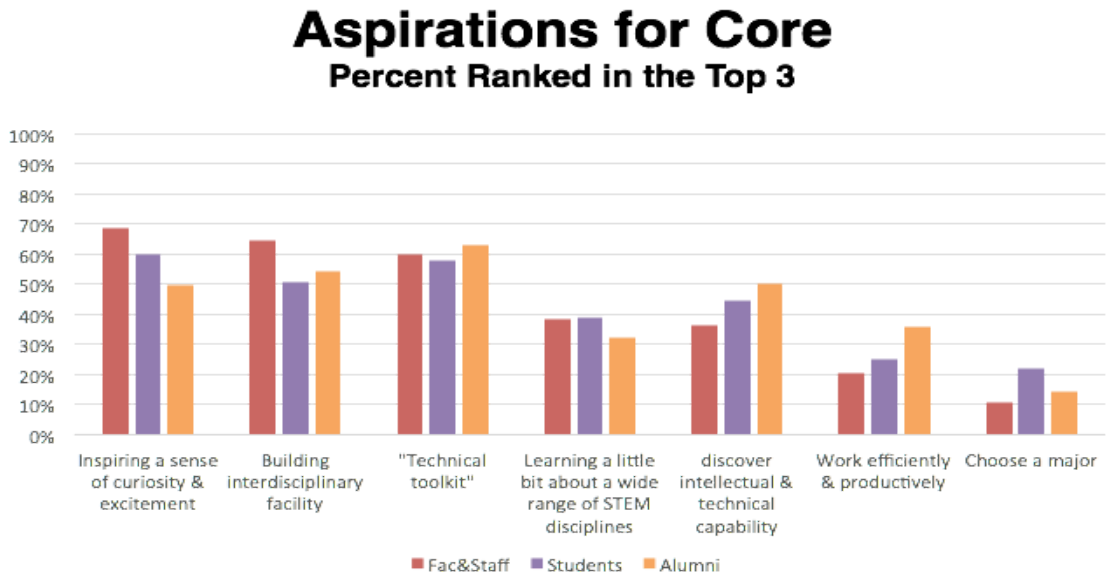
At the community session, Director of Foundation Relations, David Coons, asked David Sonner '80 if there were any data to support his assertion that Mudders get promoted earlier because they are more broadly educated. David Sonner '80 replied by saying that his beliefs were supported by numerous anecdotes and his own experience. He recalled that his first job after HMC was at TRW where he was promoted to assistant program manager after a few years. He attributed his early promotion to the fact that he knew the connections between the various pieces of the project. He recalled a colleague who was a RADAR antenna designer who stuck with RADAR antennas and who was upset that he did not get the promotion. He observed that a program manager could easily use 20 people but but will only be assigned 7 or 8 and they are specialists. A generalist can fill the gaps so senior managers like to have them in charge.

Also at the community session, Professor Geoff Kuenning observed that we have surveyed students, faculty and staff, and alumni, but missed the students who came to HMC but did not graduate. He noted that they may have a valuable perspective. David Sonner '80 replied that many of them are still in the alumni association. He recalled that his class, the Class of 1980, started with 155 started of whom 90 graduated. He noted that some of these non-graduates attend alumni weekend and all students who finishing one semester are invited into the alumni association.

Director of Institutional Research and Effectiveness, Laura Palucki Blake ran the surveys and compiled the results. She presented a summary of the main quantitative results and explained that respondents in each of the three surveys were asked to arrange each of 7 possible aspirations for the core curriculum in order from 1 to 7, with 1 being the most important and 7 being the least important. The chart shows the % of each sample that ranked the item in the "top 3" (so 69% of faculty & staff included "Inspiring in students a sense of curiosity and wonder about what is possible in a discipline" in their top 3 priorities.

She explained that the text in the chart was truncated, and provided the full text:
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
4) Learning a little bit about a wide range of STEM disciplines
5) Helping students discover what they are capable of intellectually and technically
6) Helping students learn to work efficiently and productively
70 Helping students choose a major

The graph is reproduced below:




She observed that there was a remarkable consensus that the first three were the most important.

A handout was also distributed. It showed the results of a "gap analysis" conducted on a larger set of Core characteristics. Respondents were asked how often they experienced each item in the

Core as well as how important it was. The gap is the difference between the percent reporting that it was often experienced and the percent reporting that they thought it was a high priority. The handout contained results for students and alumni but not for faculty and staff as they have not experienced the Core as a student. The items on the handout were sorted by size of gap between experience and priority. Three items on the handout corresponded to the consensus priorities and were bolded to show that correspondence.

Those table are reproduced here:

**STUDENTS**

| ITEM | Often Exp | High Priority | GAP |
|---|---|---|---|
| Covering a lot of content | 86.53% | 23.26% | 63.27% |
| Sharing a common experience with my classmates | 84.18% | 52.66% | 31.52% |
| Sharing a common experience with all Mudders | 59.68% | 35.80% | 23.88% |
| Exposure to a wide range of STEM disciplines | 85.67% | 69.58% | 16.09% |
| Learning more than just "the basics" in a wide array of STEM disciplines | 56.45% | 50.90% | 5.55% |
| Other | 70.00% | 66.67% | 3.33% |
| Exploring ideas that were new to you | 67.06% | 66.56% | 0.50% |
| Learning what you are capable of intellectually | 52.19% | 53.07% | -0.88% |
| Learning how to manage time | 66.86% | 68.10% | -1.24% |
| Preparing for study in your choice of major | 40.40% | 44.58% | -4.18% |
| Learning to think like a practitioner of each discipline represented in Core | 30.09% | 35.35% | -5.26% |
| Being challenged to do your best work | 63.66% | 71.30% | -7.64% |
| Learning to work collaboratively | 65.01% | 77.91% | -12.90% |
| Applying facts, theories, or methods to practical problems or in new situations | 59.31% | 72.29% | -12.98% |
| Learning to evaluate and interpret information | 61.21% | 75.23% | -14.02% |
| **Building a "technical toolkit" that is a foundation for more advanced study in STEM** | **63.90%** | **78.61%** | **-14.71%** |
| Meeting/learning about people different than me | 31.37% | 46.45% | -15.08% |

| | | | |
|---|---|---|---|
| Accepting that mistakes are part of the learning process | 59.30% | 78.15% | -18.85% |
| Learning to think like a humanist, social scientist or artist | 9.46% | 30.51% | -21.05% |
| **Learning to cross disciplinary boundaries** | **45.27%** | **68.37%** | **-23.10%** |
| Developing writing skills | 24.07% | 47.29% | -23.22% |
| Developing a sense of belonging to a STEM community | 41.82% | 65.88% | -24.06% |
| Developing the ability to think critically | 64.18% | 89.12% | -24.94% |
| Learning to discern relevant and reliable information to support an argument | 40.52% | 65.56% | -25.04% |
| Finding what you want to do in life | 20.64% | 46.79% | -26.15% |
| Promoting life-long learning | 35.09% | 65.95% | -30.86% |
| Developing leadership skills | 7.80% | 40.24% | -32.44% |
| Developing public speaking/presentation skills | 11.46% | 46.39% | -34.93% |
| Gaining self-confidence | 19.48% | 55.96% | -36.48% |
| **Developing a sense of curiosity and wonder** | **26.74%** | **70.03%** | **-43.29%** |
| Understanding the impact of scientific work on society | 21.45% | 69.53% | -48.08% |
| Understanding the moral and ethical implications underlying my work | 15.28% | 65.68% | -50.40% |
| Having time to reflect on material covered in each of the courses | 9.48% | 65.45% | -55.97% |

**ALUMNI**

| ITEM | Often Exp | High Priority | GAP |
|---|---|---|---|
| Covering a lot of content | 84.52% | 25.98% | 58.54% |
| Sharing a common experience with all Mudders | 68.16% | 47.51% | 20.65% |
| Sharing a common experience with my classmates | 86.57% | 66.19% | 20.38% |
| Preparing for study in your choice of major | 58.19% | 40.20% | 17.99% |
| Learning more than just "the basics" in a wide array of STEM disciplines | 64.10% | 54.31% | 9.79% |
| Learning what you are capable of intellectually | 64.75% | 56.41% | 8.34% |
| Exposure to a wide range of STEM disciplines | 86.99% | 79.80% | 7.19% |

| | | | |
|---|---|---|---|
| Exploring ideas that were new to you | 66.38% | 65.81% | 0.57% |
| Learning how to manage time | 63.78% | 64.76% | -0.98% |
| Learning to think like a practitioner of each discipline represented in Core | 33.28% | 34.44% | -1.16% |
| Being challenged to do your best work | 70.73% | 72.77% | -2.04% |
| Developing a sense of belonging to a STEM community | 50.80% | 54.39% | -3.59% |
| Other | 74.62% | 78.67% | -4.05% |
| Finding what you want to do in life | 26.23% | 30.68% | -4.45% |
| **Building a "technical toolkit" that is a foundation for more advanced study in STEM** | **75.99%** | **82.52%** | **-6.53%** |
| Learning to think like a humanist, social scientist or artist | 12.35% | 22.40% | -10.05% |
| Meeting/learning about people different than me | 25.14% | 37.44% | -12.30% |
| Accepting that mistakes are part of the learning process | 52.33% | 64.79% | -12.46% |
| **Learning to cross disciplinary boundaries** | **57.38%** | **70.31%** | **-12.93%** |
| Promoting life-long learning | 47.88% | 63.12% | -15.24% |
| Gaining self-confidence | 29.75% | 45.25% | -15.50% |
| Applying facts, theories, or methods to practical problems or in new situations | 60.40% | 77.15% | -16.75% |
| Learning to evaluate and interpret information | 67.00% | 84.56% | -17.56% |
| Learning to work collaboratively | 49.75% | 68.07% | -18.32% |
| Developing the ability to think critically | 72.84% | 92.83% | -19.99% |
| **Developing a sense of curiosity and wonder** | **35.87%** | **57.91%** | **-22.04%** |
| Developing leadership skills | 8.31% | 33.78% | -25.47% |
| Developing writing skills | 25.02% | 53.37% | -28.35% |
| Having time to reflect on material covered in each of the courses | 10.95% | 40.44% | -29.49% |
| Learning to discern relevant and reliable information to support an argument | 46.63% | 77.11% | -30.48% |
| Developing public speaking/presentation skills | 12.52% | 44.33% | -31.81% |

| | | | |
|---|---|---|---|
| Understanding the impact of scientific work on society | 25.42% | 61.47% | -36.05% |
| Understanding the moral and ethical implications underlying my work | 17.71% | 58.82% | -41.11% |

Gaps of more than 20% were highlighted with green meaning that student experience more of an item that its priority would warrant and yellow the opposite.

The people who were present were asked to have small group discussions to identify what would be right about framing the priorities with the top three results and what those top three missed.

The top three were:

(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

The groups were given 20 minutes or so to consider the questions and then were asked to report out.

There were nine separate small groups in the faculty session:

The first table did not like the term "technical toolkit." They thought that "intellectual framework," "lens," or "setting context for future knowledge" would be better.

The reporter for the second table observed that the three taken together characterize the breaking down of barriers but don't address either confidence or learning to learn.

The third table liked having a small set of criteria but said that it was missing consideration of the feasibility of what goes into a technical toolkit. They were concerned that a focus on the top three would leave the others to be ignored completely. They also asked if the survey addressed the value of students working independently.

Table four held that the Technical Toolkit was critical but lamented the absence of consideration of the impact of one's work on society in the list of important characteristics.

Table five agreed that the parts of the Mission Statement about impact and leadership were missing. They also thought that lots of content with no time for reflection was the reason that students did not think that they were getting all the skills.

Table six also agreed that understanding the impact of one's work on society did not make the top three, but also wondered if the Core was the proper place for that. They observed that the gap analysis highlights the tradeoffs and asked if collaboration were a pedagogical tool or an outcome of its own.

Table seven acknowledged the lack of aspirations addressing the mission in the top three but also noted that they did not address the structure of the Core and held that it needs a structure that does not privilege any group. They asserted that not enough is missing as the top three things are very big when taken together.

Table eight said that what was missing was consideration of how to focus on these three things while still allowing for reflection.

Table nine recalled that the goal of the original Core was to produce systems engineers and held that one providing a foundation for more advanced study in STEM would need to be even more broadening. They held that we need to be ok with some students not realizing the fruits of their labors until much later.

There were two reporting groups at the community session:

Group 1 thought that what was done right was that those three things are the great foundation upon which to build the rest of your education. They thought that the ethical impact of one's work and the Mission of the College along with writing and communications were missing.

Group 2 wanted the data to have been sliced finer and thought that consideration of the second half of the Mission Statement was missing. Several members of the group thought that impact on society should be built into every Core course. They held that the Mission Statement should not be an add-on but should be a big or even the primary lens with which you use to conceptualize the rest of the Core.

Core Curriculum Director, Tom Donnelly, observed that there would be another meeting next month on workload and student preparation. He asked participants to consider both the convergence and the shortcomings and go through the exercise of writing their own goal statement for the Core curriculum. They should also consider a Core designed to meet their goals would look like.