So You Want To Build A Data Science Program

Lessons Learned and Practical Advice For 2-Year Colleges
Day One – Ask Why?

Educational Attainment Overall 2017
Population 25-29 in age
Year 2000 on left
Year 2016 on right

Percent of 25-29 year-olds

- High School
- Assoc Deg
- Bach Deg
- Masters Deg
### Science and Engineering Bachelor’s and Master’s Degree Recipients By Race 2006-2011

<table>
<thead>
<tr>
<th>Race</th>
<th>Attended 2YC</th>
<th>Did not attend 2YC</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian or Alaska Native</td>
<td>600</td>
<td>18,000</td>
</tr>
<tr>
<td>Asian</td>
<td>48,100</td>
<td>49,470</td>
</tr>
<tr>
<td>Black or African American</td>
<td>47,530</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>100,320</td>
<td></td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>2,560</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>386,100</td>
<td></td>
</tr>
<tr>
<td>More than one race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than HALF 2YC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- More than HALF 2YC

**Day Two – Ask Why?**
Day Three – Ask Why?

### Science and Engineering Bachelor's and Master's Degree Recipients By Father's Education 2006-2011

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Attended 2YC</th>
<th>Did not attend 2YC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Than High School</td>
<td>43,000</td>
<td>57</td>
</tr>
<tr>
<td>High School, Diploma or Equivalent</td>
<td>124,200</td>
<td>145,800</td>
</tr>
<tr>
<td>Some college, Vocational, or Trade</td>
<td>126,240</td>
<td>136,760</td>
</tr>
<tr>
<td>Bachelor's</td>
<td>154,280</td>
<td>111,720</td>
</tr>
<tr>
<td>Master's</td>
<td>88,160</td>
<td>63,840</td>
</tr>
<tr>
<td>Professional Degree</td>
<td>32,160</td>
<td>15,840</td>
</tr>
<tr>
<td>Doctorate</td>
<td>29,040</td>
<td>14,960</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>9,690</td>
<td>9,310</td>
</tr>
</tbody>
</table>
Day Four – Ask Why?

PhD Recipients by Race/Ethnicity 2006-2011

- Did NOT Attend 2YC
- Attended 2YC

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Did NOT Attend 2YC</th>
<th>Attended 2YC</th>
</tr>
</thead>
<tbody>
<tr>
<td>HISPANIC OR LATINO</td>
<td>4,931</td>
<td>1,375</td>
</tr>
<tr>
<td>AMERICAN INDIAN OR ALASKA NATIVE</td>
<td>112</td>
<td>235</td>
</tr>
<tr>
<td>ASIAN</td>
<td>9,610</td>
<td>1,393</td>
</tr>
<tr>
<td>BLACK OR AFRICAN AMERICAN</td>
<td>981</td>
<td>4,452</td>
</tr>
<tr>
<td>WHITE</td>
<td>14,918</td>
<td>64,489</td>
</tr>
<tr>
<td>MORE THAN ONE RACE</td>
<td>559</td>
<td>2,047</td>
</tr>
<tr>
<td>OTHER OR NOT REPORTED</td>
<td>436</td>
<td>1,838</td>
</tr>
</tbody>
</table>

3/4 White
Day Five – Assess Current State

› Current Student Interest
› Faculty Expertise
› Outside Interest
› Potential Transfer Institutions
› Potential Research/Internship Opportunities

Math Stats
• Student Data
• Expertise

Admin
• Outside Data

CIS
• Student Data
• Expertise
Create an undergraduate Certificate in Data Science

The objectives and goals

- Support the needs of greater New England companies by providing a modern curriculum that will help local industries provide fundamental employee education in this critical, emerging area.
- Provide a foundational set of coursework that students can apply immediately and slipstream into a four-year (or higher) data science/data analytics degree
- Enhance existing computer science/computing resources with the modern data analytics and visualization tools

$10,000 was requested; $5,000 was granted
Day Seven
Who’s Hiring?

› Reach out to executives in industries like healthcare, insurance, financial services and scientific research – top industries in the greater Boston region
› Reach out to the Data Science community at large
› Reach out to institutions of higher education

Results (2013-14)

› Need is for highly skilled professionals with at least a Master’s Degree
› Internships limited availability with more applicants than positions
› UNH – Manchester - let’s talk about articulation
Day Eight – Certificate Development

MODEL A
OCEANS OF DATA
› Profile Of The Data Practitioner
› April 2016
› Colleges include: Bunker Hill (MA), Normandale (MN), Johnson County (KS), Sinclair (OH), Wake Tech (NC)

MODEL B
PARK CITY MATH
› Data Science as a STEAM program
› Lots of Math
› Colleges of CCSNH: Manchester and Great Bay (NH)

Core Requirements:
› MATH225 Probability and Statistics 4 credits
› DATA210 Elements of Data Science 3 credits
› MATH235 Statistics For Science/Engineering 4 credits
› DATA220 Data Analysis w/ R 3 credits
› DATA225 Analytics Capstone 2 credits

Supporting Course Work:
CIS177 Introduction to Python       ARTS125 Visual Language
Day Ten – Associate Degree (2016)

› Designed as a transfer program
› Follows nationally developed recommendations (Park City Math Institute)
› Academically challenging – STEM path
› Diverse student population
› Non-traditional Approaches
Eleventh Day – Looking Back

› Qualified faculty must be in place or have plan in hand before ink is dry
› Marketing and recruiting strategy should be part of the design process
› Costs of maintaining, promoting, and review need to be included
› Existing staff loads need to be able to handle extra time required to help recruitment
› Plan to be part of national efforts to develop these programs
› Short term course enrollments may be low
Twelfth Day – Looking Ahead

› **Partnerships**
› **People**

21st Century Skilled Workforce

Striking the right balance
Reference Material


› Downloadable Program Sheet: http://greatbay.edu/sites/default/files/media/ProgramSheet_PracticalDataScience-Cert.pdf

› Certificate Program at Manchester Community College: http://www.mccnh.edu/academics/programs/mathematics#cert1

› Great Bay Community College Degree Program Description: http://greatbay.edu/courses/degree-programs/analytics

› Program Sheet (Downloadable): http://greatbay.edu/sites/default/files/media/ProgramSheet_Analytics.pdf

› Undergraduate Programs in Data Science (Guidelines backed by the American Statistical Association, ACM, and developed by a grant through the Park City Math Institute): https://www.amstat.org/asa/files/pdfs/EDU-DataScienceGuidelines.pdf