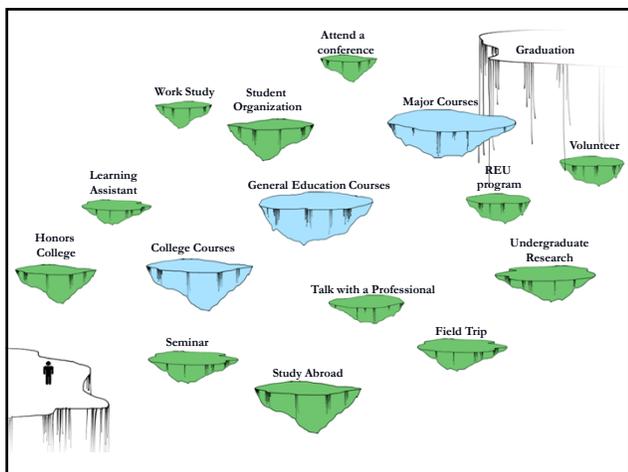


Lyman Briggs College

- Science residential college at Michigan State University
- Incoming class of 625 freshman (about 1800 total)
 - No additional requirements for entry
- Students required to take chemistry, biology, physics, calculus, and HPS (history, philosophy and sociology of science) courses
- Dedicated faculty in all these disciplines



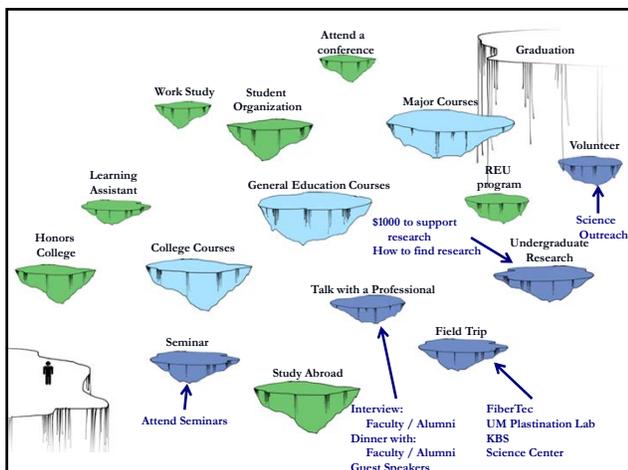
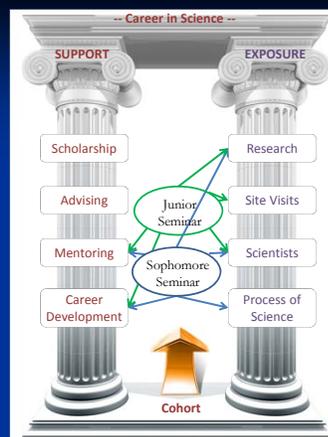
Scholarship Program

- Funded by NSF S-STEM grant
- Provide scholarship money to students
- Support students throughout program
- Expose students to science careers

Program Outline

Student year	Scholarship amount	Additional Class
1 st	\$0 – apply for scholarship	
2 nd	\$3000	1 credit Seminar
3 rd	\$6000	1 credit Seminar
4 th	\$9000	LB 492 (Science Education)

- 2 cohorts of students
 - 15 in 1st cohort (2009)
 - 14 in 2nd cohort (2010)
- \$1000 in research funds available for each student
- Trips to KBS, grad fairs, etc.



Assessment of Experience

- Interviews with students
 - Yearly interviews with students investigating experiences, attitudes, and motivation
- Reflection papers
 - Course-based reflections on major activities (interactions with professionals, seminars, etc.)
 - Cumulative reflections

Interviews

- Semi-structured interviews
 - Designated protocol, but open follow-up probing questions
- Interviews transcribed
- Identification of key themes

Interviewer: Okay, just for the record this is Ryan Sweeder here interviewing Allison. So thank you very much for participating in the interview.

So reflecting on the last year, how is your understanding of science changed?

Allison: Mostly about the, like, things that are available to me. So just knowing what's out there, how I can get to it. How I can get involved in research or in, you know things to help further my knowledge on science and – I think the biggest thing was like the REU's. I never knew there was that much funding, and they pay for you, if you wanted to go do an out-of-state and those types of things. I probably wouldn't have applied for those types of programs, just thinking I couldn't afford it.

Interviewer: Right.

Allison: So a lot with the funding. Just realizing what's out there.

Interviewer: Excellent, and what was it that kind of helped you become more aware of that?

Allison: We had a speaker in the class that talked about all the REU's, and what was available, and then you guys talked about it. Yeah, I mean, just having the information presented to me, instead of me having to go find it made it a lot easier.

Interviewer: So you said you applied for them, did you get any positive responses?

Allison: I haven't applied for any, yet, but you know – Now I know that I can, but there have been things that I never would have even thought of doing and now I am definitely considering it in the future.

Interviewer: Okay, so is it just the knowledge of it or is there a confidence issue that's also present?

Allison: I think it's both, because I – You know, I'm the type of person who would be like, "Oh, well, they'll have all these requirements that they want, and I'm missing one or I'm missing two or maybe I'm not the best." And maybe I would have passed those up, but we talked a lot in class about, if you don't apply, you're not gonna get it. You might be the most qualified person that applied, so—

Interviewer: Everyone may be missing some of those things.

Interviewer: And were there particular things that you mentioned that talking to the faculty, but were there any other things that kind of helped you gain this new appreciation?

Allison: The fact that they all changed their mind about what they wanted to do so much, because I have changed my mind quite a few times about what I want to do and I've been worried that, you know, maybe I'm passed the point where I can change my mind, but we talked to people who changed their minds after they graduated from their undergrad and completely pursuing something different for their graduate program, so – Just knowing that I still have time to make those decisions is kind of nice.

Interviewer: Well, I think you always have time too.

Allison: Yeah.

Interviewer: You know you may just have multiple careers, like the different lines.

Allison: Yeah.

Interviewer: So at this point, do you think you have something that you would say that is a pretty firm plan for a career or is it still pretty nebulous?

Allison: See, now, I don't for sure, 'cause I was pretty sure that I wanted to teach high school, and that was what I wanted to do. I wanted to teach high school chemistry, and I had looked at research careers a little bit before that, and I kinda stepped back away from it, but you know, this course – This whole program has kinda helped me look at it a little bit more, and I'm not completely disregarding it at this point. So I'm looking at it a little more now.

Interviewer: So you kinda have these two different possibilities, so maybe being a high school teacher or maybe doing research or maybe somehow finding a way to merge them both?

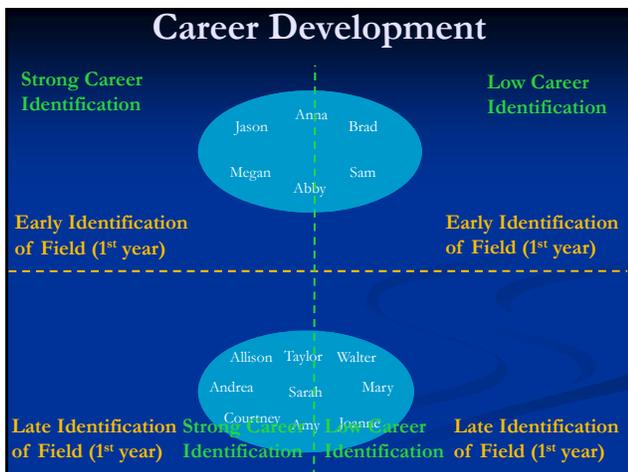
Allison: Uh-huh.

Interviewer: Do you feel prepared for either of those paths or both of those paths?

Allison: I do, yeah. I feel like this – this program is preparing me for both. And it's helping me to look more at the

		Career Ideas							
Name	Gender	1st year		2nd year		3rd year		4th year	
		Path	Confidence	Path	Confidence	Path	Confidence	Path	Confidence
Abby	F	Medical Research	Low (career)	Undecided Research	Low	PhD, Biotech Industry/ Government	Low	PhD, Biotech Industry/ Government	High (low specificity)
Allison	F	Enviro Science or HS Science Teacher	High (?); no confidence when reflective	High School Science Teacher	High	High School Science Teacher	High	High School Science Teacher	High
Amy	F	Work with Animals	Moderate	Work with Animals	Moderate	Environmental Science	Moderate	Environmental Science	High (field); Low (job) Comfortable
Andrea	F	Genetic Counselor	High	Genetic Counselor / Teaching	Moderate	Undecided – College Teaching (?)	Low	Science Writing	High (field); Low (job) Comfortable
Anna	F	Genetic Counselor	High	Genetic Counselor	High	Genetic Counselor / Grad School	High	Genetic Counselor / Grad School	High
Brad	M	Undecided	Low	Undecided Medical	Low	Applying Stem Cell Research / Grad School	Moderate (field unspecific)	Medical Research via Grad School	Moderate (field unspecific)
Courtney	F	Undecided (had thought doctor)	Low	Undecided	Low	Epidemiology	Moderate	Global Public Health, Research	High
Jason	M	Professor Neuroscience	High	Professor Neuroscience	High	Professor Neuroscience	High	Professor Neuroscience	High
Joanne	F	Medical (?)	Low	Undecided Medical	Low	Field of Nutritional Science	Moderate	Nutrition & Public Policy	Moderate
Mary	F	Experimental Scientist (chem/biochem)	Moderate (?)	Experimental Scientist	High	Industrial Scientist	Moderate	Industrial Scientist (3 yr rotation with Ford)	Moderate

Name	Gender	Cohort	Increasing Scholarship	Diversity	Interactions with Scientists	Overall Impressions
Abby	F	2010: I just think that listening to what my peers had to say about what they want to do in the future and 2010: It's been great, because we all have similar goals and similar interests, but at the same time there's like a wide array of	2010: didn't really worry about the money. It was nice. 2011 Less stress, didn't have to work another job 2010: no loans. No other job necessary, can focus on volunteering for research (not paid) 2011: Business stress, focused on	2010: So that aspect of just having this set of like-minded students, even though it's not the same as the other cohorts, but that's not through Dr. Wawrzynski's presentation on summer research and the visit to Kellogg Biological Station I learned	2010: One thing that is not mentioned above is that both of them do not have degrees that say immunology or microbiology. 2010: Throughout the semester, however, I heard the stories of many successful scientists who had chosen their paths	First year found out what it really meant to be a scientist. Also understood quickly the value of the cohort centered on the. Initially unsure, moved quickly to confidence in teaching, though still sees other avenues as possible.
Allison	F	2010: they're nothing alike yet you still find a lot to talk about and discuss - you know where you wanted to go	2010: No loans, little real cost; 2011 no loans; 2012: no loans, think the structure worked really well	2012: project helped find out what make a group function well. Respect	2010: It was nice to be able to speak to people in the field who had changed their paths so many times and	sophomore year kind of lost, but developed a better feeling for what she wanted. Didn't progress
Amy	F	2010: The cohort bonding experiences were really important to all of us. We can rely on each other	2010: Increasing not a huge issue. It will be nice with costs going up. "I think it makes it you	2010: I like having the diversity a lot because I think - I'm not sure. I just - I feel like it - you're not	2010: The faculty dinner also resonated with me. I was able to ask questions about careers, research,	Interesting path. Freshman sophomore Started fairly confident, Junior/Sophomore lost it,
Andrea	F	2010: positive ("I found another student who's doing the same thing I am so when we decide to go into research	2010: less loans ("...the program I think is a big benefit and then the financial on the other hand it allowed a lot of freedom	2010: "It broadens the view a little bit. You can see what they're doing and how they're getting to where they want to be	2010: "Although I did not get to interview with a clinical geneticist, the research I did as	sophomore year experiences solidified decision to go into genetic counseling and gave tools needed for work
Anna	F	2010: It's really helpful to have a group of people who are supportive of your interest in research	2010: Incentive to keep going. Program ok w/o \$ ("...it allowed me to focus on	2012: "I think that it definitely helped quite a bit, you know. They have obviously a pretty wide set of jobs, and a lot of	2010: "The most enjoyable activity I participated in was probably the dinners with the professors... and	sophomore year helped solidify science career and clearly what role he wanted to play in research. Junior
Brad	M	All friends. Able to ask them questions. Jasmine 2010: "At first I thought it was a really random group	Felt she could do it, eased stress. Not working. Taking more classes (Arabic) 2010: T	2012: "But I really - just the whole process of going through, and like the application process and	2010: "I feel like the things I learned over the course of the past couple of months have been extremely	Sophomore year learned about a lot more career paths and graduate education (changed her
Courtney	F	Good, people with common concerns/experiences, get	Less stress, could take lower paying LA job	2010: "It's really been advantageous. I've really	2010: "It's really been helpful to be able to talk to	Sophomore year was certain of career path, but



Development of Confidence

- Late identifiers for career found more self-confidence / empowerment
 - *"I feel like this class and all of our experiences has definitely made me like ten times more confident in myself..." -Sarah*
- Early identifiers of careers solidified career decisions
 - *"... and just kind of for me it did help show me what the different options were, but that - you know, it kind of reinforced the reasons I had picked what I'm doing." - Jason*

R. Sweeder, P. Strong, *J.STEM Ed*, 2012.

Impact of Interacting with Scientists

- Identification of career path
 - *"One of my favorite activities of this semester surprisingly ended up being the interviews of someone working in a scientific field. ...I left the interview feeling like I could see myself working in that type of environment sometime in my career. ...talking to Christie and seeing how excited she is about the studies she's doing and how passionate she is about her work really made me feel like there is a place for people who actually feel strongly about issues and want their work to make a difference in the field. I want to be at the point someday where I have found something I am excited about and have made a career out of it."* – Courtney

Impact of Interacting with Scientists

- Identification of career path
 - *"Dr. Thomas inspired me to connect ideas, talents, and passions to find out what I want to do and when I figure it out, to start on the path right away. I realized a possible career for the future recently, in part because of Dr. Thomas getting me to think, I would like to explore some options of working in science museums creating exhibits. It ties in my love of science with my creativity, past experiences in museums, my love for children and education, and outreach in communities."* -Taylor

Impact of Interacting with Scientists

- Appreciating uncertainty in career path
 - *"The fact that they all changed their mind about what they wanted to do so much, because I have changed my mind quite a few times about what I want to do and I've been worried that, you know, maybe I'm passed the point where I can change my mind, but we talked to people who changed their minds after they graduated from their undergrad and completely pursuing something different for their graduate program, so – just knowing that I still have time to make those decisions is kind of nice."* – Allison

Impact of Interacting with Scientists

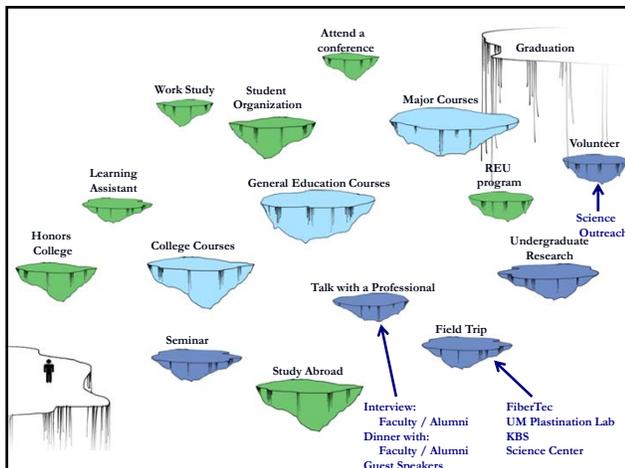
- Seeing how they fit into science
 - *"...I mean she was working with fish guts but she says 'they are my fish guts and I love working with them.' ... so I realized, you know, I can go into research it just has to be my kind of research then it definitely broadened my opinion on not shutting out everything."* - Amy
 - *"I have a physics grad student mentor ... Just seeing what their life is like and talking with them, it just didn't seem like the right fit for me just yet."* – Mary

Impact of Interacting with Scientists

- Developing their networking skills
 - *“The events which were planned with the Briggs alumni are useful in that they provide a practice field for communicating with professionals in science and realizing they are people just like us, and there is no need to feel intimidated or nervous. I believe many students our age are held back from resources because they are too afraid and uncomfortable to call and talk to someone. The skills we acquired by talking to the alumni and visitors in the class help us to be comfortable approaching people and building our network throughout our student and professional careers.” ~Anna*

Impact of Interacting with Scientists

- Identification of career path
- Appreciating uncertainty in career path
 - Career paths are non-linear
- Seeing how they fit into science
 - Becoming part of the science community
- Developing their networking skills (and scientific network)



Desire to pursue research

- One third of students reconsidered research as a career.
 - *“I think I have a more positive outlook about research careers, ‘cause I’ve always thought that that’s not what I want to do, but I’m looking at it more now – now that we’ve talked to people who are in those positions. We talked with professors who do research and I’ve kinda gotten to hear about their daily lives and that – I mean that really helps for me, just knowing that they’re not always just shut up in a lab.”*

R. Sweeder, P. Strong, *J.STEM Ed.*, 2012.

Implications

- We need to actively help our STEM students make connections with scientists
 - Visitors to class
 - Connections with alumni
 - Faculty sharing their personal paths (students see single frame of a professional's life)

Outcomes

- Of 15 supported students:
 - 14 graduates (spring – twelve, summer–two)
 - (one on pace for Spring 2013 graduation)
 - Seven entering graduate education
 - Three starting jobs
 - Two in flux



Future Directions

- Complete program with 2nd cohort of students
 - (14 more students)
- NSF-funded 3rd/4th cohorts
- Continue to evaluate impact on graduates (one and three year follow-up interviews are planned)

Acknowledgements

- Philip Strong
- Jonelle Golding
- Kathleen Jeffery
- Rick Shipman
- S-STEM students



NSF-DUE S-STEM
#0849911, 1153778

