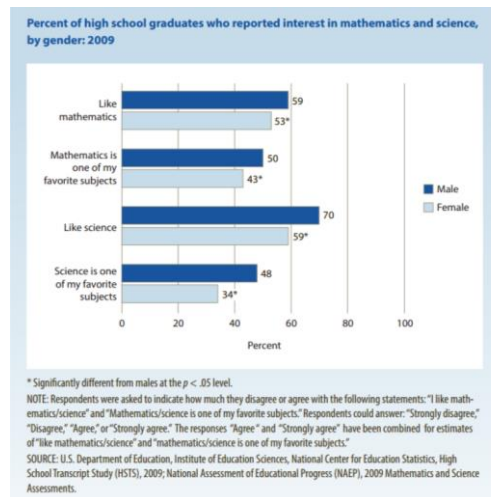


Final Project

“To the Stars and Back” (TtSaB) provided an incredible opportunity to middle-school girls in the greater Muncie area. As long as they could be dropped off and picked up three days in a row, they received free meals and expert instruction from Ball State College of Science faculty (and mediocre instruction from Woodrow Wilson Fellows such as myself). The goal of the camp was not simply to expose the girls to fun science activities; it was to get them excited about doing science. As the figure below from the National Center for Education Statistics (2009) shows, the percentage of high school graduate girls who responded that they like science was significantly lower than the percentage of boys who said the same. Likewise, a significantly smaller proportion of girls responded that science was one of their favorite subjects.



This suggests that any underrepresentation in the workforce for girls in the sciences is at least partially attributed to the fact that before girls even graduate high school they are predisposed to like science less than boys, for some reason. This camp aimed squarely at smashing this predisposition, and while it cannot be known for certain whether it was successful in its aim, I can attest that it certainly provided the girls (and incidentally, myself) with real reasons to like science.

It is important to view this camp not in a vacuum, but as a function of where it was set – Muncie, Indiana. I will be using U.S. Census Bureau estimates in order to compare the area with the nation in several key areas which have a connection to the readings, discussions and activities from class. I will then provide a first-hand account of relevant camp events and how they relate to the High-Leverage Practices (HLPs) we discussed in class. I will then conclude by providing suggestions on how to improve the camp, based on the objective realities surrounding the camp as well as my personal experiences at the camp, in this class, and elsewhere.

According to the U.S. Census Bureau, the median value of owner-occupied housing units in Muncie from 2010-2014 was an estimated \$70,400. The figure for the state of Indiana was \$122,700 and that of the entire nation was \$175,000 (American Community Survey (ACS)). This is just one example of the state of Muncie's economic situation; another is the proportion of residents living in poverty. In the United States, approximately 14.8% of people live in poverty. In Indiana, the percentage is similar at 15.2%. However, for Muncie the figure is more than twice those at 33.1% (ACS, Current Population Survey (CPS)). From our readings, Rury argues that it has been difficult historically for America to utilize schools and, more generally, education to address the problems of poverty and inequality on a large scale (Rury, 190-7). This explains why these features of Muncie remain, decades after the disappearance of industry decimated the area. However, this camp's original goal was to reach out to girls from dozens of these less-well-off families and connect to them each on an individual basis. Given more idealistic conditions, large numbers of girls from these impoverished families would have been able to experience quality science education, if only for three days. However, mysterious forces were at play in silencing these families: the eventual camp roster was stocked largely with girls from families of Ball State faculty and staff. Even when efforts are made to favor students from disadvantaged backgrounds,

those students fall through the cracks and get left behind. A more concerted effort is required to successfully connect with these impoverished students and their families, and provide them with the opportunities more readily available to the better-off.

Of people aged at least 25, the percentage with a bachelor's degree or higher in Muncie from 2010-2014 was estimated at 22.4%. The corresponding proportion for the United States was 29.3% (ACS). As a result, it is significantly more likely in the Muncie area than elsewhere to encounter families headed by those who did not graduate college. An extension of that result could be that the values placed on students from such families could be different than what someone who graduated college would expect. Blackwell and Angelov write, "Families often struggle to understand expectations and traditions of schools. Particularly at risk are families with low school completion rates - families with members who dropped out of school" (109). Even such a short experience as TtSaB can provide students with a taste of what is expected from them in an academic setting while also striving to be a place where the student feels empowered to problem-solve and ask scientific questions as they would in a more formally-structured classroom environment. Blackwell and Angelov may well argue that the camp may be reinforcing the white, middle-class cultural capital values of constraint on the working-class and poor students (104). I would respond that if those values are being exercised in their academic institution anyway, they might as well be married with the relatively relaxed camp atmosphere exhibited by TtSaB. I also saw zero instances of a student being reprimanded for any reason during the camp so to the extent that the cultural capital was foisted upon the students it wasn't punitive in nature.

At first glance, it may seem as if there is a correlation between the proportion of people living in poverty in a given area and the proportion of people with a disability in that area.

Indeed, according to the American Psychological Association, “Persons with a disability are likely to have limited opportunities to earn income and often have increased medical expenses” (1). In addition to having had a poverty rate over twice that of the national average, Muncie had an estimated 14.0% rate of disability among those under age 65 from 2010-2014, while the national rate was only 8.5% (ACS). Note that the American Community Survey is only attempting to capture the aspects of disability which are easily determined by a subset of just six questions. Specifically concerning cognitive difficulty, the ACS asks if respondents have “serious difficulty concentrating, remembering, or making decisions” (Definitions, 58). This method of data collection may introduce a serious bias toward a lower proportion than what truly exists, as many parents of children with cognitive difficulties in the classroom may not sense the difficulty to be “serious”, or they may not be aware of the difficulties at all. Therefore, particularly concerning students and their performance in the classroom, the rate of incidence not just in Muncie but across the country is likely larger than the represented proportions above. This makes it all the more important to determine how we will educate disabled students. Hochschild and Scovronick opine that “[T]he cautious but steady move in the United States toward inclusion of most students with special needs is one of the best examples of how Americans can, when they choose, manage the conflicts built into the American dream” (148). Whether a widespread inclusion policy or a more individualized decision-making process is best for students is a critically important question, but it is even more critical in places that also exhibit systemic poverty, like Muncie. Although I am not aware of any students at the camp who may have had any cognitive or physical disabilities, I am confident that those in charge of questions of accessibility and instruction would have been accommodating as best as they could, which could

have worked wonders for an underserved child who may have routinely lacked adequate care for their condition.



Several of my experiences during the camp aided my reflection on the properties successful educators possess, as well as some of my own strengths and weaknesses in assuming an educator-type role. In the following paragraphs I'll expand upon these touchstone moments, and relate them to the High-Leverage Practices (HLPs) that serve as the basic fundamentals of quality teaching.

The opening quartet of lines in the sonnet that accompanies this paper were influenced by a conversation I had with one of the students in my group on the first morning of camp. Unprovoked, she said something along the lines of, "This is summer vacation, I don't want to learn!". I couldn't tell at the time whether she was being genuine and if so, if her mind could be changed. I told her that maybe she could be open to the possibility that she could learn things, but that it might just be fun. She wasn't having any of that. However, by the end of camp I

noticed that she was indeed enjoying herself in the pursuit of doing science. This is one example of HLP 3: eliciting and interpreting individual students' thinking. I didn't have an easy time interpreting the student's words extemporaneously, but by the end of the three-day camp I could be comfortable in the knowledge that if she were to say something to similar effect, it may take only an exciting activity to discredit that negative sentiment. This is a practice that master teachers hone over many years and upon which I hope to improve quickly in my own classroom.

Of all the professors brought in to teach a lesson for the camp, the biology professor appeared to have the easiest time adjusting from her everyday interactions with university students to providing instruction to middle-schoolers. When students would answer questions in a way that didn't quite get at the intended concept, she would be very quick to give a reassuring response such as, "close, but not quite..." that would not only keep the student from feeling bad at giving a wrong answer, but reinforce the question-answer dialogue as productive and safe for exploration. Also, when students pointed out some mistakes she may have made during the experiment, she immediately admitted that they were right and that being vigilant was a hallmark of "doing good science" which they were already adept at displaying. This professor has a good grasp of HLP 7: specifying and reinforcing productive student behavior. We've talked about productive dialogue in Dr. Roebuck's class, and it is very important to get students involved and to encourage them that they can express their ideas in the classroom. Even if they aren't on the right track, it is imperative to create an atmosphere where dialogue between students is reinforced as a good thing – after all, one of the most difficult things to do in class for a good number of high schoolers is to speak up in class, even if they know they're right.

An effective way to promote interpersonal dialogue in the classroom is to incorporate small group work. This is the concept described in HLP 9: setting up and managing small group

work. An example from camp of this not necessarily working so well was the solar robot construction. The girls were split up into groups of four, so I had two such groups in my overall team. Right from the beginning, it was clear that the girls were much more interested in getting their hands on the robot's components than to use the instruction manual to put the robot together slowly but surely. I repeatedly had to ask if the girls were utilizing the directions, and I would be summarily ignored. An important part of inquiry teaching is to understand students' prior knowledge: I would venture to guess that to the extent that these girls play with similar dolls/toys at home they likely don't consult an instruction manual, so to expect them to want to do so in this situation was not taking into account their natural playing styles. It is also important to note that at a late point in the activity, one group of girls had screwed on their robot's head incorrectly and in such a way that it was impossible to undo the error. They became very frustrated at this, and the frustration only escalated as the other group's robot was completed and they got to play with it outside. I eventually asked the successful group if they could share their robot with the other group, so they could at least experience what a completed robot could do. However, the unsuccessful group never got to feel the ownership of completing a robot and that may have even soured their entire day. I recognize it is crucial that I design group activities such that every group can experience success and to minimize any concept of competitiveness, real or imagined.

To conclude I would like to provide a few suggestions that might help the camp to better meet its intended goal of empowering low-income middle-school girls to do science. I thought the actual three-day camp was put together very well. Incorporating female science faculty (where available) was a nice touch, and the idea to rotate among different sciences kept the day moving along and preventing boredom from creeping in. However, I do think that "passing periods" should be incorporated if there is a similar camp provided next year. The Fellows

weren't sure whether to leave a given room early or arrive at the next room late as there was no time built in for travel between them. Also, if the group leaders could be intimately aware of what will be discussed prior to the start of camp, that will enable them to more readily assist the faculty in their activities. In many cases, we Fellows were unaware of what the activities were, and if instructions were being given while we were helping students, we would not be able to assist on the instructions we weren't able to hear. If the group leaders could be given a demo on the activities or at least given the handouts and instructions for the activities, there would be a more cohesive environment for constructive learning.

The most glaring shortcoming of the camp from my perspective was the failure to attract girls from low-income backgrounds to the camp. A majority of the girls from my group (and I've heard from others as well) were middle-class children of Ball State employees. I'm not aware of the method of advertising/determining the campers that was made, but I'll outline a suggestion for the next camp. The University likely has a robust list of local middle schools. I would have someone contact them in the winter sometime and determine a science teacher liaison from each school who would have prospective campers in class. These teacher liaisons could give names of several students from low-income backgrounds that through their relationships with the students/families they know may be interested in attending the camp. From these lists a master list of potential campers could be determined. A random sample of names could be chosen, and then the teachers of the selected students could give the parents a University-constructed form gauging their interest in the camp. Several rounds of dialogue may be necessary to answer questions from parents and re-sample if needed. By the time school lets out in the spring, the final list of campers' names could be determined. I will add that if it is truly a goal to get lower-income students to the camp, it may be a wise use of grant money to provide transportation to

and from campus. I strongly believe that the lack of provided transportation was the only reason some lower-income families couldn't commit to bringing their children to the camp. Perhaps properly-vetted volunteers or other community members could handle transportation.

In sum, this camp provided a positive experience for the campers. They likely aren't aware of the invisible pressure our culture exerts on them that drives them away from scientific fields. If every middle-school student could be exposed to such a fun, well-constructed program, I imagine many more of them would express an interest in science. However, it was also beneficial for myself as a prospective teacher. I was able to see master teachers at work, in an element where they were comfortable (science classroom), but also perhaps inexperienced (working with young children). In my own experience with the campers, I could try out a few things I thought might engage the girls and talk with them to learn their backgrounds, what they were interested in, and figure out how good of a job we were doing. Given the amount of interest the girls had in potentially attending camp again next year, I hope it becomes a reality. It's always good for more students to be exposed to science in a way that is educational, interpersonal, and fun.



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