

The Case for Summer Bridge: Building Social and Cultural Capital for Talented Black STEM Students

Abstract

This study uses focus groups to examine the importance of a pre-college summer bridge program for highly talented black students in science, technology, engineering, and mathematics (STEM). Longitudinal data were collected from 134 participants who identified three aspects of Summer Bridge that were particularly helpful: academic, social, and professional. An in-depth approach and emphasis on developing a strong community sets the Meyerhoff Summer Bridge apart from many other orientation programs. Furthermore, by enhancing students' cultural and social capital, the program helps students succeed. The findings illuminate elements of orientation programs that are useful to talented students and offer insight into important means to enhance summer bridge programs.

Introduction

An extreme achievement gap exists between white and black students in science, technology, engineering and math (STEM) fields. Although Blacks represent almost 13% of the US population, in 1998 black students accounted for only 7.9% of STEM bachelor's degrees, while Whites were awarded 69.8% of the degrees. Eight years later, in 2006 when those same students would have had an opportunity to complete a PhD, Blacks earned only 2.5% of STEM doctoral degrees (National Science Board, 2008; National Science Foundation, 2010). This inequity in STEM completion rates exists even among well-prepared students

and has been attributed to academic and cultural isolation, low-performance expectations on the part of students and faculty, unsupportive peer communities, and both perceived and real discrimination (Gandara & Maxwell-Jolly, 1999; Nettles, 1991; Seymour & Hewitt, 1997; Steele & Aronson, 1995). Furthermore, factors such as exclusion from social networks and lack of cultural knowledge about the academic scientific community may also impede the success of talented black students.

The Meyerhoff Scholarship Program (MSP) at the University of Maryland Baltimore County (UMBC) has been recognized as highly successful in promoting underrepresented minority access to and performance in STEM fields (Bowen, Chingos, & McPherson, 2009; Building Engineering & Science Talent [BEST], 2004; Chemical Sciences Roundtable, 2003; College Board, 1999; Gandara & Maxwell-Jolly, 1999; Gordon & Bridglall, 2004; Koenig, 2009) and provides the setting for this research. The effect of the program is evident: black students who participate in the MSP are about twice as likely to graduate with a STEM bachelors degree (Maton, Hrabowski, & Schmitt, 2000; Summers & Hrabowski, 2006) and are five times more likely to go on to the PhD than similarly prepared comparison students (Maton, Sto. Domingo, Stolle-McAllister, Zimmerman, & Hrabowski, 2009). Over 50% of black students in recent cohorts have pursued STEM PhDs or MD/PhDs (Maton et al., 2009). These figures place UMBC and the MSP as one of the leaders in minority student retention and success in STEM (Koenig, 2009). Within this context, the Meyerhoff Summer Bridge is essential.

In previous quantitative research of the MSP, students rated it as one of the most helpful program components, giving it 4.5 out of 5 on a Likert scale (Maton et al., 2009). However, little evidence is available showing *why* Summer Bridge is successful.

This study is the first in depth qualitative analysis of longitudinally collected data and analyzes the MSP's Summer Bridge component. In particular, this research helps isolate the effective programmatic and social elements of Summer Bridge and examines them through the lens of social and cultural capital. By using the Meyerhoff Scholars' voices and methods from grounded theory (Glaser & Strauss, 1967) and naturalistic inquiry (Lincoln & Guba, 1985), we are able to gain an insider's view of the program which can benefit both researchers and practitioners. This research, then, examines the aspects of the Summer Bridge program that were most helpful to these talented students and places a particular emphasis on the ways in which Summer Bridge helped them enhance their chances of success by building their social and cultural capital.

Background

Summer bridge programs.

The summer bridge literature mainly stems from theories of attrition and persistence (Astin, 1993; Tinto, 1993). Generally, the overarching goals of summer bridge programs are to remediate academic skills, inform about campus life, orient to institutional culture, help develop social networks, focus goals, and help students begin college with a positive outlook. As part of that process, most programs involve placement testing, academic advising, registration,

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and orientation to the campus and student organizations (Ackerman, 1991; Fletcher, Newell, Newton, & Anderson-Rowland, 2001; Garcia, 1991; Gilmer, 2007; Gold, Deming, & Stone, 1992; Perigo & Upcraft, 1989; Walpole et al., 2008). Overall, this orientation process has a direct effect on social integration and institutional commitment as well as a strong indirect effect on persistence (Pascarella & Terenzini, 1986).

While summer bridge is important for students in general, it can be particularly important for underrepresented minority and STEM students. McKenna and Lewis (1986) argue that underrepresented students need to be introduced to college academically, socially, emotionally, and culturally. For many, summer bridge programs offer an effective method of facilitating the transition and adjustment to university life and improving academic performance and persistence rates (Ackerman, 1991; Garcia, 1991; Gold et al., 1992; McElroy & Armesto, 1998; Pascarella & Terenzini, 2005; Walpole et al., 2008). In the STEM arena, academic integration in science and socialization in the scientific milieu are important issues (Bowman & Stage, 2002; Gaston, 1989) and Brazziel and Brazziel (1997) note that schools that produce high numbers of minority STEM degrees have a summer bridge component. STEM summer bridge programs have been found to positively affect participants' perceived social fit, coping skills, and college preparation, and to decrease student anxiety (York & Tross, 1994) in addition to providing a familiarity with the campus and a review of STEM content (Fletcher et al., 2001). Furthermore, Moore (2006) argues that meaningful programs and opportunities that allow students to see how science works in real life are particularly necessary for African Americans.

Summer bridge programs are effective for students because they help them begin to integrate academically and socially to the university milieu. Given the call for more networking opportunities and a deeper introduction to the professional world, particularly for African Americans and STEM students (Fletcher

et al., 2001; Moore, 2006), a further, and perhaps more long-lasting, benefit of bridge programs is the opportunity for students to build their social and cultural capital.

Social and cultural capital.

Essentially, summer bridge programs are one way that students can be afforded opportunities to build their social and cultural capital and facilitate access to and participation in STEM. The work of Pierre Bourdieu (1986) offers a framework for understanding this process.

Briefly, Bourdieu's concept of social capital can be best explained by conceptualizing it as a person's acquaintances and social networks. If one has more prestigious and well-developed social networks, then one has more social capital (Bourdieu, 1986). Building on Bourdieu's work, Coleman (1988) emphasizes that social capital relies on trustworthiness and a sense of obligation, provides information channels, and operates within normative structures which both facilitate and restrain the actions of actors within that structure. He argues that social capital comes about through changing relationships with people who facilitate action. The concept of social capital can be further understood by a study of Lin (2000), who emphasizes social resources within a network and the quantity and/or quality of those resources that are accessed through an actor's location in a specific social network. Within this context, an increase in social capital increases the chances of returns. However, when disadvantaged groups, particularly minorities and women, participate in homogenous networks, their capital tends to be reduced. Therefore, gaining higher status requires strategic access to wider (or dominant) circles (Lin, 2000). Within STEM, therefore, increasing one's social capital means establishing and maintaining contacts with influential and prestigious actors in the field.

Cultural capital, a close cousin of social capital, is field specific and can often influence one's social capital. Bourdieu conceptualizes cultural capital, sometimes considered "informational

capital," to be cultural goods and services, including educational credentials (Bourdieu 1986, Bourdieu & Wacquant, 1992). This concept also covers verbal facility, general cultural awareness, and information about and ability to navigate the school system (Swartz, 1997). It is important to note that the dominant culture defines the legitimacy of cultural capital and its practice (Bourdieu, 1984[1979]). Building on this, Lamont and Lareau (1988) specify cultural capital as including social class attributes and indicators of social position such as dress and manner. These indicators themselves become mechanisms for social selection and exclusion. The accumulation and activation of (dominant) cultural capital can have positive effects in school and serve as a mechanism for advancement for less privileged and underrepresented groups (Carter, 2003; Kalmijn & Kraaykam, 1996; Lareau & Horvat, 1999). If traditionally underrepresented populations are to succeed in STEM, they need the cultural tools to fit into that field. In particular, black STEM students need not only the academic qualifications to enter the field, but also the cultural mannerisms and dress that would grant them access to and acceptance in the STEM community.

Meyerhoff Summer Bridge.

Bolstering social and cultural capital requires an introduction to and practice in the cultural and social norms of both the university and the STEM community. Through participation in a comprehensive summer bridge program, students can become familiar and comfortable with their roles as students and scientists and begin to develop the social and cultural capital that will ease their way in STEM. The Meyerhoff Summer Bridge has a strong emphasis on academic *and* social components and focuses on enhancing strengths, rather than remediation, for its high achieving students. A highly scheduled, intensive six-week residential program, Summer Bridge takes place on the UMBC campus during June and July prior to students' freshman year. Not only do students take college-level courses for credit and receive an

introduction to campus and college life, but they also engage in structured group bonding activities, attend site visits, and become fully integrated into the MSP. Student days are often scheduled from before 8:00am until after 11:00pm and, as such, students and staff often refer to the program as “boot camp.”

During Summer Bridge, students take two college courses for credit (math and Africana studies) as well as a physics or chemistry seminar; structured group study takes place from 7:00 to 11:00pm on Mondays through Thursdays. Students also participate in twice-weekly seminars on professional development and public speaking, and workshops on business performance, dress, and etiquette are required. Several hours each week are dedicated to program discussions with staff, faculty, and university administrators. Additionally, students attend site visits to premier research laboratories, receive academic advising from staff and older Meyerhoff peers, attend university orientations, and participate in workshops on diversity training, study skills, and counseling services.

Throughout Summer Bridge, group bonding, cohesion, and mutual responsibility are stressed. Students participate in all their activities as a group, rotating leadership roles and working through issues. Meyerhoff staff and Dr. Hrabowski, the president of the university and founder of the program, regularly meet with the students to validate their special talents and highlight the ideas of self-confidence, responsibility, and group success. Students are required to remain on campus, and some evenings and all weekends are dedicated to structured group activities such as trust building activities (ropes courses), group entertainment (a trip to the mall or amusement park), cultural activities (museum visits), and community service projects.

Because the Meyerhoff Summer Bridge is rated as one of the most helpful components of a highly successful program (Maton et al., 2009), it merits a closer look. An examination of this program can help fill in the gap in the

summer bridge literature by focusing on talented, underrepresented, minority STEM students. Furthermore, Bourdieu’s notion of social and cultural capital provides a framework for understanding the program and qualitative methods allow practitioners and researchers to understand the program from the students’ perspectives.

Method

While earlier quantitative work has established the importance of the Meyerhoff Summer Bridge to program outcomes (see Maton et al., 2000 and Maton et al., 2009), we needed to employ qualitative methods to examine the underlying processes at play and the importance of this component from students’ perspectives (Krueger & Casey, 2009; Merriam, 1998). We used techniques from grounded theory (Corbin & Strauss, 2008; Glaser & Strauss, 1967) and Lincoln and Guba’s (1985) “naturalistic approach.”

Participants.

Larger than many qualitative studies, our longitudinal sample is comprised of 134 different participants representing the entire Meyerhoff experience—from newly entering Summer Bridge students to graduates of the program holding PhDs. We used a purposeful sample of only current and past Meyerhoff students and to gain depth and richness of results, we met with members of the 2006 entering cohort six times during their undergraduate careers. The return participation rate among that cohort was 82%. The overall sample was almost evenly split among men and women with 65 males (49%) and 69 females (51%). Of the 134 participants, 85 (64%) were African American, 23 (17%) were Asian/Pacific Islanders, 22 (16%) were Caucasian, and 4 (3%) were Hispanic. Our study participants were representative of the overall MSP, with a majority black population. These numbers can be compared to the UMBC undergraduate population of roughly 10,000 students of whom 16.5% are African American, 21.2% are Asian American, 58.3% are Caucasian, and 4% are Hispanic. It is important to

note that while not all the students in the program or in our sample are black, the program was designed for and retains its emphasis on promoting black student success in STEM (Maton, Hrabowski, & Ozdemir, 2007). To increase our internal validity and to avoid oversampling any one subset of students, we randomly selected participants with the exception of the 2002 cohort (current seniors) and the graduates who were a convenience sample of volunteers.

Because we needed expert informants (Honigmann, 1982, Merriam, 1998; Patton, 1990), we used a purposeful sample of only current and past Meyerhoff students. Current Meyerhoff students were able to discuss what they found helpful or challenging and to detail their experience in real time. Furthermore, by meeting with students at various points in their undergraduate careers, we were able to ascertain which aspects of the program are helpful at different time points and how student experiences change or remain the same over time. Graduates of the MSP were better able to recognize key factors that led them to pursue advanced STEM degrees and the aspects of the Meyerhoff Scholarship Program that influenced their educational endeavors. Although recall bias is a possibility, this group provided insight into the underlying mechanisms through which the Meyerhoff Scholarship Program had long term effects on their success.

Procedure.

We used focus groups as our method of data collection because they are a good tool for understanding specific college programs (Jacobi, 1991; Kaase & Harshbarger, 1993) and they yield rich data, allowing researchers to gain understanding of different perspectives within a group process (Krueger & Casey, 2009; Morgan, 1997; Taylor & Bogdan, 1998). Furthermore, in order to involve as many participants as possible and to gain a broader understanding of the program, we conducted group interviews rather than individual ones. Each group had between three and nine participants and lasted approximately one and a half to two hours. We did not do any purposive

sampling related to gender or race/ethnicity and no groups were homogenous with respect to gender or race/ethnicity.

The focus group protocol focused on how the MSP works from the students' perspectives. We kept the protocol unstructured and posed open-ended questions to allow students to generate discussion about the aspects of the program they thought were important and to avoid leading student answers. Generally, questions focused on components of the program that were particularly helpful (or unhelpful), specific skills that students acquired during their participation in the Meyerhoff Scholarship Program, the group processes at play in the MSP, mechanisms through which the program had an impact on their STEM PhD and research career intentions, and their identity as Meyerhoff Scholars.

The focus groups were moderated by an experienced, skilled researcher with an assistant moderator providing logistical support. None of the moderators or members of the research team were affiliated with the MSP in any capacity. The focus groups were audio recorded and transcribed and every participant gave informed consent, was assured privacy and anonymity and, to that end, was assigned a pseudonym.

Data analyses.

The transcripts totaled almost 1500 single-spaced pages of text and were analyzed using NVIVO7 software. Working as a team, four researchers conducted the coding and used techniques from Glaser and Strauss' grounded theory (1967), beginning with open coding to generate categories. Working with the same transcript, we each individually coded the material and met as a group to discuss our coding. We worked with the initial transcript, coding it multiple times, to develop consensus about definitions for codes and interpretations. Having a consistent understanding and utilization of codes helped ensure our coding was accurate and reliable across researchers (Lincoln & Guba, 1985). Once we had established consensual coding, researchers discussed any new codes with the entire group either in person or through

email as the need arose. During our analysis, we worked in teams of two, redundantly coding each transcript, constantly revisiting the data, and keeping audit trails to make sure our findings were trustworthy (Lincoln & Guba, 1985). Throughout the process, we used the constant comparative method (Glaser & Strauss, 1967) and worked up from the data, using inductive analysis and making sure our coded data were heuristic and able to stand alone (Lincoln & Guba, 1985).

Results

Participants in every focus group, without exception, viewed Summer Bridge as an important component of the MSP. Students reported that Summer Bridge helped them integrate to the MSP and the academic, social, and professional expectations of STEM. Through their intense academic schedule, intentional and intensive socialization activities, professional development, and meetings with program staff and premier scientists, students came to understand what is expected of them, their capabilities, and what they could expect from themselves. Students were pushed to perform and to build a strong community and it was this experience that proved most rewarding and helped increase their self-confidence and sense of achievement, and provided them with the social and cultural capital necessary to succeed in STEM.

Student descriptions of their Summer Bridge experiences can be separated into the acquisition and refining of three, overlapping categories of skill sets: academic, social and professional. While these skills might seem commonplace to summer bridge or orientation programs, students frequently reported on the intensity of those experiences as fundamental to their formation as Meyerhoff scholars.

Academic.

Students in the Meyerhoff Summer Bridge develop and reinforce multiple academic skills during their six weeks on campus. Although the Meyerhoff students are highly capable and excelled in high school, they felt that the Summer Bridge program provided them with

new academic skills specific to course type, multiple perspectives and support through study groups, and an academic advantage over other incoming students. One student, at the end of his Summer Bridge program said:

I think that the Summer Bridge program has given us a lot of skills that we're going to need and it has also helped set any wrongs that have been within us throughout high school and before that. And I kind of think of it as...if a person breaks their bone and they never get it set the right way, it will grow the wrong way. In order to fix it, you have to break it again and set it the right way.

Students also receive training in effective classroom strategies such as sitting in the front row, asking questions of professors, attending office hours, and asking for academic assistance. For many students, they saw the benefits of these skills later in their academic career, particularly when classes became harder. One Meyerhoff graduate said:

... you get into Meyerhoff and Summer Bridge, and you're supposed to sit in the front of the class. And it's not for fear of getting in trouble, but you learn more, you see more. You know? You want to participate actively. So, for me in grad school, it wasn't even a thought: that's just where I sat. ...I say "sitting in front of the class" and it sounds trivial but you build upon those habits where you're like, "okay I sit in the front of the class because I want to hear." If I can't hear or don't understand I'm going to follow-up and meet that teacher. ...So, just the habits that are small would make a difference; that's what was important.

For high achieving students, asking for help from professors, staff, and other students is a new experience. Coming out of high school, most of these students had not had to study hard and were unaccustomed to needing or asking for

help. A graduate of the program said that Summer Bridge was:

...overwhelming. I just hit the mark [cut-off] to go to the more difficult [math] class [chuckling] and I was feeling the pain. And, I don't know, for me I had to break through the barrier of going to other people for help and I'm not used to that. I wasn't used to that at the time.

Of all the academic lessons during Summer Bridge, the one most mentioned by the students was that they have the ability to achieve in school and in STEM. Most participants expressed feelings of academic self-efficacy by the end of Summer Bridge and were confident that they had the necessary academic skills and coping strategies to succeed in their first year of college. They developed self-confidence in both their academic abilities and in their stamina, knowing that they could push themselves and perform. One student summed it up with, "After Summer Bridge, I don't think there's going to be any problem with anyone academically or with any kind of stresses that come along in college. I think we can do it now. I mean, after Summer Bridge, we can do it now."

Social.

Students learn and develop social skills during Summer Bridge, including leadership training, conflict resolution, communication skills, and diversity training. However, they reported that one of the most important aspects of Summer Bridge was the development of a strong support system that carries them through their college years and graduate school. The social aspect of the program is intentional, intense, and, at times, difficult. However, students said they "learned how to step outside [their] comfort zone..." and that they benefited and gained new understanding from it.

Social leadership skills, in particular, posed challenges for students. In talking about their experiences as being weekly group leaders, they said "[The leaders of the week] have to sometimes make tough decisions for the group," and "... it was just a hard lesson to learn. It just

teaches you different things about leadership that aren't always the easiest to cope with." Another important lesson they learned was how to resolve conflict, dealing with issues as they emerge, speaking honestly, learning to listen, being open to other viewpoints, and not "holding grudges." In particular, working with a large group of students from different socioeconomic, racial, and school backgrounds, posed a challenge for students, but they said they gained an "...understanding that we come from different places. The 60 different cohort members, we come from 60 different backgrounds, families, taught 60 different things."

In addition to challenges, the diversity of the group brought rewards. Students were both surprised and pleased by finding new friends and forging new relationships with people who were different from themselves. One woman said:

I didn't expect the diversity. I went to an all-black school or a majority black school so, naturally, I hung out with the black kids. And when I got here I started out with all the black kids and then you branch out and you find out, "Oh man, these other kids are cool too." It's just a different experience, having people of different cultures as your friends.

Furthermore, students thought that learning how to deal with diversity allowed them to achieve more and would help them in the "real world." They said, "You learn how to get along with different kinds of people. ...so then when you're out in the real world—you're different. You're used to seeing different faces. You're used to not just being with people that are exactly [like you]."

Beyond social skill development, Meyerhoff students develop a strong, interdependent support system. The Meyerhoff program stresses group responsibility and group success and, as such, during Summer Bridge, infractions and successes are experienced by the whole cohort as a group, rather than individuals. Almost all Summer Bridge activities are communal—including walking to the dining hall

and class, preparing for site visits, and even grades in one of the math classes (although exceptions are made). This heavy emphasis on group cohesion, reliance, and support is a cornerstone of the program and many students emphasized that it is unique to Meyerhoff:

I think that [group cohesion is] something that's missing from a lot of programs because any other scholarship program, it's more like you're there for the money... but Summer Bridge is like the forced bonding experience. You have no choice. It's like the gate to your college career because if you can't make it past Summer Bridge as a Meyerhoff, you're not going to make it to the school year and it just... it bonds you to everybody around you first of all, and it helps you understand that in college things can't be done by yourself. Very few people can make it through without any help and in a way, that's why a lot of other people fail, a lot of other people at different schools drop out at such a high rate because you're used to making it by yourself in high school. This is not high school. And classes aren't taught that way so you need other people to survive.

Group accountability and responsibility also help students realize they are not in competition with each other, but are working together to improve themselves as a group as well as individuals. A post-bridge student realized:

I think Summer Bridge has taught me that as individuals, we're all intelligent. ...But a lesson that I definitely learned, and I think a lot of us learned, is that somebody else's A does not take away from your A. ...It just means you both succeed.

Not only does the concept of group accountability establish a sense of solidarity, it also pushes students to achieve on an individual level:

If one falls, we all fall. If one rises, we all celebrate with them. And I think seeing all 59 different people, you've gotten to be really,

really good friends with, it makes you want to do better for yourself. And instinctively you're saying, "OK. I don't want to fail these guys because I know they're pushing for me to succeed."

Students develop a cohesive, multi-layered support structure, including immediate peers, other Meyerhoff Scholars, faculty, research mentors, the University administration, and the Meyerhoff staff who are deeply committed to students and their overall wellbeing. This support system helps students feel academically and socially prepared to begin college and they feel they have an advantage over other students:

So the idea of a family away from the family is almost what it is. You have that support structure away from home and that's important because a lot of students come into college without any kind of support structure. They're here all by themselves, at this big campus, and have no idea what to do. Whereas we come in with people our age, a year or two older and then even the staff, who have overseen things here for 5, 10, even more years. So we come in with all this support and all these resources.

This sense of family is deliberate and is achieved through the intense scheduling of both academic and non-academic activities. Students spend almost every minute of Summer Bridge as a group and in addition to on-campus activities, studying, and coursework, students participate in out-of-class activities that help them learn from each other and build trust. A student said:

It's not all just scholastic during Summer Bridge. You think, of course, most of it is classes, but you just deal with things you never had to deal with before. We had this trip we took—[a confidence course]—we had to climb the rocks. And that had nothing to do with science at all really. Not really. It was just teamwork and helping people and motivating people to, you know, get to

the top. ...Without Summer Bridge, I don't think it would be as much of a family as it is. I mean that's what really started it.

Summer Bridge is certainly the time when the "Meyerhoff Family" is established and program staff work diligently in helping students become part of it. The idea of the "Meyerhoff Family" is often met with skepticism in Summer Bridge but by the end of the six weeks, students agree that they have formed a supportive, durable "family." A junior said:

Well, I know the first day here, Summer Bridge, they put us all together in a big room and they said, "Well, look around, these are your brothers and sisters." And we just laughed. It was like, "Who are those people? I've never seen them in my life and they're telling me they're my new brothers and sisters?" But then we have 6 weeks to get to know each other and bond. And then we spend the next 4 years studying together, doing everything together so in a way we form this little community where we know that if we fall, there's somebody to pick us up. And those are the people who are always there for you, no matter what, and you can count on them.

This idea of family carries beyond Summer Bridge and even the undergraduate experience. All of the graduate focus group participants said they relied on other Meyerhoffs during their graduate work as well as during their professional careers. When they were uncertain or needed support, graduates of the program said they often turned to someone from the MSP for help.

Professional.

Participants frequently mention site visits and the professional skills they acquired during Summer Bridge as being extremely useful to them during their academic careers and when entering the workforce. Research site visits provide students with early exposure to research, clarify differences between fields, give them an idea of what a career

in research might involve, and give them the push to get started in research early in their undergraduate careers. One student said, "...site visits do help you see what going into different research areas are really like." In addition to exposure to different research fields, site visits allow students to begin establishing the contacts and networks they will need to obtain a research internship:

...so having gone to different labs, we have more information about where we could possibly do some research and we actually met the people doing research now. So we have a greater chance of getting into internships than most freshmen do.

Students reported that one of the most valuable aspect of the site visits is that they are able to see and understand how a science research career might look, begin to envision themselves as a researcher, and feel a sense of self-confidence that they will be able to attain a career in STEM. One Summer Bridge student said, "...with the site visits, seeing everything and observing this is what they do in their careers, I feel kind of comfortable being able to do that so... It's kind of like, 'Yeah, I can do this!'"

At every level of experience, participants talked about the importance of professional skills. Students discussed the training they received, how it made them realize their past mistakes, and how it prepared them for the future. A graduating senior recalled:

They [program staff] would actually inspect us to see how we were dressed. If we were dressed inappropriately, we were told to go back and fix whatever issues that we had. We actually had a dining night where we learned where all the glass and all the silverware goes. How you actually go from out, in. We actually had practice sessions about handshakes. If your handshake was too weak, they were like, "what is this?" They really called us out on really basic stuff that seems kind of minor, but it turns out to be very important.

One student said professionalism is “a Meyerhoff skill.” Students are taught to know people’s full names and titles and they also learn how to present themselves. After her first internship, one student recalled:

Meyerhoff made sure we would introduce each other—introduce ourselves to other people. And that really helped, because this summer...I was able to go up to people and [say], “My name is so and so. I’m doing this. What about you?” It made it open doors.

Professionalism is an area where older Meyerhoffs, and even graduates, specifically mentioned Summer Bridge as being important in their development and helpful to their careers. A graduating senior said:

Yesterday I went for a job interview. And I remember Summer Bridge we had the whole little etiquette thing: look somebody in the eye, how to sit up straight in a chair. And then [during the job interview] it was kind of like a group interview... and when we all sat down, I was the only person sitting up straight. Other people were slouching when the person was talking to us.

By combining instruction, exposure, and practice in professionalism during Summer Bridge, students are able to have a concrete vision of their future. One Summer Bridge student said, “... when you go on site visits...you see people that are successful in their careers and they have all the qualities that you’re being taught during Summer Bridge and so it pretty much in turn shows you where you’ll end up being.”

Criticisms.

While the strategies employed by the program are effective, they are not always popular with all the students. The intensity of the program is a difficult adjustment for many. One student recalled his Summer Bridge experience, saying, “When you have 45 people like that, it’s just that nobody’s used to doing that. It’s high stress. Summer Bridge is a killer.”

Most commonly, complaints relate to the schedule, study groups, and group bonding. With respect to academics, while Summer Bridge helped “fix” old study habits and form new ones, some students, at the end of Summer Bridge, thought study groups were “ineffective.” Some participants disliked the intense group bonding and, in particular, the concept of group responsibility. In one group of seniors, a student said, “The problem was that in Summer Bridge they want you to believe that the sins of your brothers and sisters affect everybody.” Other participants in that group added, “If one person screwed up, everybody paid for it.” In a different group, however, a student was discussing group responsibility and said:

It actually makes sense. My father, he works for a company and he does projects and they all have different parts of the project—so now it makes sense because if one doesn’t do their part in the project then it messes up the whole contract. So I see the strength of it now. Back then I didn’t. But now I see it.

Almost uniformly, students complain during Summer Bridge but also acknowledge the benefits they receive. With time and distance, students look back and realize that they use the skills they learned in Summer Bridge and that those skills help them be successful in STEM. Furthermore, many students say Summer Bridge both contributed to and is a measure of their strength. A graduate of the program said:

[Summer Bridge] was not a fun time, to say the least. It was the most trying part of my life until I started grad school. [laughter] During my time at UMBC, I kept telling myself and other people that went through it, “If you can go through Summer Bridge, you can get through anything.”

Discussion

While the results of this study focus on the Meyerhoff Program, they also bring to light many concepts that could

be applied to other programs. Of particular note is that these highly talented individuals all refer to Summer Bridge as being a formative and extremely helpful experience. Some of what they say resonates with what we already know about summer bridge: academic preparation is important (Ackerman, 1991; Gilmer, 2007; Gold et al., 1992; Perigo & Upcraft, 1989); social and academic integration helps ease students’ transition to college and leads to greater success (Garcia, 1991; Tinto, 1993; Walpole et al., 2008); and an exposure to professional settings is useful to underrepresented minority STEM students (Bowman & Stage, 2002; Gaston, 1989; Moore, 2006). However, by framing students’ academic, social, and professional development in terms of Summer Bridge’s ability to raise students’ social and cultural capital, this project points toward the larger issues that may affect student success. Individuals not only need to have facility in their particular subject matter, but they must also have access to networks of other professionals and they must acquire competence in the norms of STEM organizations (labs, universities, government agencies). While some students may have access to this capital through histories of family connections or their own cultural backgrounds, the Meyerhoff Summer Bridge explicitly provides and helps students activate the social and cultural capital that helps students succeed in college, and the STEM area in particular.

Consistent with findings that early academic involvement helps students integrate into their institutions and improves retention rates (Ackerman, 1991; Garcia, 1991; Gilmer, 2007; Gold et al., 1992; Tinto, 1993; Walpole et al., 2008), the Meyerhoff scholars indicated that college-level coursework and academic skills development helped them integrate into their academic environment. Furthermore, they cited academic self-confidence and academic-related skills such as study habits, time management, and classroom skills as particularly important. This further supports findings by Lotkowski and colleagues

(2004) who found these skills have the strongest relationship with retention.

Similar to the students in other studies (Fletcher et al., 2001; York & Tross, 1994), the Meyerhoff scholars benefited from the social aspects of the program. A sense of self-esteem, respect, and belonging are important to students in general (Terenzini et al., 1994) and forming a community with other black scholars is particularly important for black students (Fries-Britt, 2000). Tinto (1993) says that social integration is initially more important than academic integration because the academics play out against the backdrop of social issues and concerns about social membership. This initial concern for social belonging is certainly true for the Meyerhoff students. Many of their discussions center on the idea of social support and the sense of belonging they have with each other. Although the initial social network can be a source of challenge, Meyerhoff Scholars ultimately point to the “Meyerhoff Family” as essential.

The results from this study also reinforce the importance of early exposure to meaningful professional opportunities (Moore, 2006). Exposure to premier research venues during Summer Bridge are important for giving students focus, allowing an understanding of what a science research career entails, and envisioning themselves in similar positions. Through these experiences students increase their goal commitment, which is another important aspect of student retention (Lotkowski et al., 2004; Tinto, 1993).

All of our findings support McKenna and Lewis’s (1986) argument that under-represented students need to be introduced to college academically, socially, emotionally, and culturally. What we discovered in this study is that a good summer bridge program will go beyond mere introduction and will provide students with in-depth, rich experiences whereby they have the opportunity to put new skills into practice, develop a strong and nurturing community, and begin to integrate into a professional field. Essentially, an excellent summer bridge

program will help students increase their social and cultural capital.

What we learned from the students is that through the in-depth experiences of the Meyerhoff Summer Bridge they improved their social capital and the particular emphasis on the Meyerhoff family is especially important to them. Networking within the university community not only helps students feel academically and socially prepared, but also gives them an advantage over other students. By introducing students to various research sites, PIs, providing contacts at institutions and universities, and by engaging students in existing professional and academic networks, the program exponentially increases students’ ability to access and become involved with these networks. Through the process of developing relationships with these prestigious actors and agencies, students increase their social capital (Bourdieu, 1984[1979]; Bourdieu, 1986). Furthermore, teaching students to know and use people’s titles (particularly if they are influential or prestigious) and introduce themselves to professors and researchers helps students expand their social networks both on- and off-campus. This Meyerhoff connection expands the reach of students and improves their access to and acceptance in various scientific communities, which can be especially beneficial to minority groups, in particular (Lin, 2000).

The “Meyerhoff Family” is a particular component of the program that boosts students’ social capital. The deliberate development of community and cohesion is one of the hallmarks of the MSP. Students are “forced” to bond with each other during Summer Bridge and these relationships carry them through their academic careers. More than belonging to their cohort in name, Meyerhoff Scholars become deeply rooted in the program community and have a network of support available to them before they begin their freshman year. By prioritizing the development of a supportive and nurturing community, the Meyerhoff Summer Bridge establishes a “family” by the end of the six-week orientation. When they were uncertain or needed

support, graduates of the program said they often turned to someone from the MSP for help, a clear sign that the processes begun in summer bridge constitute the beginning investment in these students’ social capital. The Meyerhoff Family reflects Coleman’s (1988) notion of social capital by emphasizing obligations and trustworthiness, information channels, and effective norms and sanctions. As students participate in diversity training, social leadership skills, and conflict resolution, they develop a strong, foundational community within the MSP and these skills also carry into the larger community, allowing students to expand their social networks beyond UMBC and STEM. The support structure they build during Summer Bridge helps students feel a sense of belonging, preparation, and self-confidence for their entire academic and professional careers.

One of the great strengths of the Meyerhoff Summer Bridge program is that, in addition to developing social capital, it exponentially increases students’ cultural capital as it provides them with both instruction and practice in acquiring new skills. Students are explicitly told and shown what to do and how to behave. Furthermore, the students correct and practice, and master and internalize their new skills.

In the academic arena, students are not only introduced to college-level courses but they are taught specific skills such as good note taking, time management, study group skills, navigating the university system, employing classroom strategies, and learning how and where to seek help. All these elements, as they become incorporated into the students’ repertoire, add to students’ cultural capital as they are able to excel in the culture of the academy. Bourdieu and Passeron (1977) assert that traditional pedagogical techniques do not meet the needs of students who are “deficient” in capital and that those who gain their knowledge through regular academic coursework can be successful academically, but they are too “scholastic” in their cultural style. By providing extra lessons and different approaches to academia, summer bridge

programs can provide students with the tools they need and help them develop a natural style before they begin college. Through opportunities to practice and learning how to seek help and rely on others, Meyerhoff students acquire and implement academic skills, thereby gaining cultural capital, a heightened sense of self-confidence, and a taste of success.

While family building and networking aspects of summer bridge increase students' social capital by forging networks of peers and granting them access to the circuits of institutional authorities, their cultural capital is intentionally developed through their exposure to the norms of their professional fields. In the extremely critical professional arena, the Meyerhoff Summer Bridge provides its students with an invaluable increase in their cultural capital and facilitates their entrée into the professional world. By instructing, modeling, and correcting professional standards and behavior, students develop the cultural capital necessary to gain acceptance as STEM researchers as well as a vision of themselves in that capacity. Many young students, even those with high academic abilities and a good social support system, must be taught how to use good posture, shake hands, interview, and dress professionally as well as have opportunities to interact and use their new skills with other accomplished people. Given the fact that underrepresented minorities accounted for only 6% of the doctoral level positions outside of academia in 2005 and that European Americans occupied 80% of the full-time STEM faculty positions in 2006 (National Science Board, 2008), newcomers must be able to fit into existing STEM norms. This is not to devalue other experiences and ways of being, but the cultural context is very different in an urban black high school than it is in the halls of the NIH, for example. Students must increase their cultural capital in order to be accepted in the professional world (Kirschenman & Neckerman, 1991; Moss & Tilly, 1996). Helping students develop their academic skills, CVs, and present themselves on

paper, provides them with an opportunity to advance. However, if students are unable to compete at the personal level, they will not be allowed entrance to an internship, graduate program, or job.

Limitations and future research.

This study is limited in several respects. Our study of one program makes it difficult to generalize our findings to other populations and programs, especially since the MSP is unique in its comprehensive approach and selectivity of students. However, the fact that our research provides insight into the inner workings of a successful group of students does not mean that our findings do not have validity or are not relevant to the larger issue of student success in STEM. Second, our study does not include any quantitative outcome measures with respect to retention or success in STEM. Previous research has already established the success of the program (e.g., Maton et al., 2009); furthermore, based on our repeat meetings with some participants and by meeting with participants at various points in their careers, we are able to have a snapshot of their experience with the Summer Bridge program and the effects they claim it has on their success. And third, although most of the participants in our study were randomly selected, there still exists the possibility that the students who actually participated were not fully representative of the entire Meyerhoff population. Given the fact that we received negative comments and feedback regarding different aspects of the program, however, we do not think that our participants are necessarily a select subsample of "cheerleaders" of the program.

These limitations lead to important future research questions. Would focusing on developing social and cultural capital be even more effective in bridge programs targeting different populations? For example, what effect would it have on programs for first-generation college students, Latino/a students, or women? Would it be possible for a comprehensive summer bridge program like the Meyerhoff Summer Bridge to be the sole intervention? Would we see

sustained results if it stood alone or as part of a few components, rather than being part of a comprehensive 4-year program? And finally, if existing undergraduate programs were to either add or enrich a summer bridge program, one which focused on increasing social and cultural capital for its students, would they be more effective in both the short- and long-term?

Conclusion

Not only is the Meyerhoff Summer Bridge important, but it is a defining, critical experience for Meyerhoff Scholars and is the foundation for the success of both the students and the program. While this research focuses on a bridge program designed for talented, underrepresented minority STEM students, the lessons learned could apply to talented students anywhere. An intense orientation, one which goes beyond basic courses and superficial introductions, provides talented students with the challenge they need. Fostering high expectations and a cohesive community helps students develop skills and personal connections. Furthermore, by developing students' social and cultural capital, orientation programs help position them for success.

This study illustrates that orientation programs for talented students still need to focus on developing academic, social, and professional skills. However, the depth of the experience and instruction is important. Academic skills (including asking for help) need to be explicitly illustrated and put into practice. By having intense and deliberate community building activities, students develop a strong sense of belonging and an internal network which promotes and enforces acceptable norms. This social aspect is clearly the foundation upon which students build their support network and forge relationships that will sustain them through their undergraduate careers and beyond. Exposure and professional access to wider communities allows students an opportunity to practice their new skills and build a broader social network. Students also benefit from specific professional skill training to help them

bridge the transition from student to professional. By providing training in dominant forms of cultural capital, students are able to successfully navigate a wider social sphere.

Students must learn how to navigate the university system, learn the accepted modes of professional conduct, and be allowed to experience and participate in them early in their academic careers. Through early exposure and practice, students can build social and cultural capital and increase the field of opportunity available to them.

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