AC 2009-452: DATA-DRIVEN COMPREHENSIVE MENTORSHIP IN ENGINEERING: HOW WE ARE ADAPTING THE SOCIAL-STRESS MODEL OF PEER INFLUENCE

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Data-Driven Comprehensive Mentorship: How We Are Adapting the Social-Stress Model of Peer Influence at West Virginia University*

Introduction

Appalachia encompasses parts of 13 states, stretches from western New York to northeastern Mississippi, and is home to more than 20 million people. Several major cities, including Atlanta, Birmingham, Knoxville, Cincinnati and Pittsburgh, are included within the region. However, West Virginia is the only state considered to be entirely within Appalachia's borders[1].

It has long been believed that high-tech industries with higher-paying jobs would improve the lives of residents of Appalachia. Careers in the sciences, technology, engineering and math (STEM) are one route to improved economic stability in the region and improved quality of life for families and communities. Yet, by almost any measure, the difficulties in attracting high school students to STEM careers are exacerbated in Appalachia, and especially in West Virginia. Declining population and, in particular, out-migration of college graduates and in-migration of less-than-high-school graduates characterize the region [2].

McDowell County, West Virginia, has the lowest in-migration of the more-than-400 counties in all of Appalachia [3]. More than 20 percent of U.S. residents have college degrees, but only about 14 percent of residents in Appalachia have college degrees, with West Virginia the lowest state on this measure [4]. In the most rural Appalachian areas (not counting the large metropolitan areas), the college graduation rate averages only 7.75 percent, with Lincoln County and McDowell Counties in West Virginia at the very lowest end of that scale at 4.72 percent and 4.59 percent, respectively [5]. West Virginia has among the highest dependency ratios in the region [6]. [Note: Dependency ratio is defined as the number of dependents under age 18, plus dependents over age 64, divided by the number of those persons between 18 and 65, living in the same household, or $DR = (n<18 + n>64)/(n\ 18 - 64)$].

Among all 13 states in Appalachia, the northern part of the region, including West Virginia, has the highest mortality at 10.24 persons per 100 residents compared to the U.S. rate of 8.8, complicated by the lowest fertility rates among women 15-44 years of age, at 55.42 births per 100 residents compared to the U.S. rate of 66.70 [7].

Residents in Appalachia have lower median family incomes than the rest of the U.S., and in the very poorest areas, the disparity has accelerated [8,12]. Not surprisingly, the Appalachian region has high unemployment, with West Virginia's McDowell County second highest in the late 1990s at 22.74 percent for men and 20.84 for women [9]. One major industry in Appalachia, coal mining, employed 229,494 workers in 1980, but dropped to 99,801 jobs by 1996; the manufacturing sector in Appalachia lost 202,173 jobs in the same period [10]. The poorest regions in Appalachia compete with more affluent states and even with Appalachian metropolitan areas in attracting businesses and jobs.

Are all of the indicators and trends negative in Appalachia? No. Economic gains and living standards, in particular, have come closer to national averages if we take the long view across the 40-plus years of the existence of the Appalachian Regional Commission (ARC). "Economic convergence has been attributed to several factors, including diffusion of technology to Appalachia's rural communities, significant population losses in the most distressed areas, the economic [and technical] spillover from adjacent metropolitan areas (especially Atlanta) ...and focused efforts by the ARC, state and local governments in the region" [11].

Increasing the number of high school students choosing STEM college paths and, ultimately, STEM careers is one way, and perhaps the only way, to attract the kinds of jobs that are needed to provide long-term, diversified, economic growth to the region. This kind of change will, in turn, provide for strengthened families, higher salaries, and a higher standard of living for local residents, and will reduce family and economic disparities.

In pursuit of this goal for West Virginia residents, West Virginia University's (WVU) College Engineering and Mineral Resources, along with the Colleges of Human Resources and Education, and Arts and Sciences, embarked on a multi-intervention plan to attract high school students to STEM careers, and put more STEM graduates into the STEM career pipeline, with a focus on women and underrepresented minorities. The primary vehicle for this project is a STEP grant through the National Science Foundation (NSF) which supports exactly this kind of initiative.

One important part of WVU's Engineers of Tomorrow (EoT) project is comprehensive mentorship, or peer influence, defined loosely as planned but informal relationships among high school students and engineering undergraduate or graduates for the purpose of sharing information about college life, college courses, career choices, and engineering as a profession. Mentorship channels are interpersonal at the EoT summer camp, but also include virtual communities such as Facebook, special help for engineering students in freshman calculus and physics courses, and special on-line "bridge courses" to foster interest among high school students in engineering and STEM careers before they get to college.

Of the half dozen separate interventions in the EoT project, all but one make strong use of peer mentorship because after two years of pilot study and three years into the project's life, we are convinced by empirical evidence that comprehensive mentorship is probably the most powerful tool to meet our project goals, ultimately leading to increased numbers at the STEM undergraduate level.

Model Development

In an effort to provide a sound, research-based foundation for Engineers of Tomorrow, the program faculty adapted a well known, robust model of drug and alcohol prevention known as the Social Stress Model, first mentioned in the psychosocial research by Jason and Rhodes in the

1980s [13, 14]. A manuscript synthesizing 35 separate research studies using the social-stress model of prevention was presented by Lindenberg, et al., in 1993. The authors summarize the model when they write, “The social stress model of substance abuse builds upon and integrates knowledge from numerous psychosocial theories and models. According to this theory, the likelihood of an individual engaging in drug abuse is a function of the stress level and extent to which it is offset by stress modifiers such as social networks, social competence, and [social] resources” [15].

Prior to its use in EoT, the model had been applied in West Virginia among inner-city youth as part of a drug and alcohol awareness program [16] and as part of a helmet use and bicycle safety project [17]. More recently, the same robust model has been used to predict alcohol use among rural adolescents [17] and among Hispanic immigrants [18]. The same slightly modified model of social stressors and moderators that influence vulnerability or decision making is relied upon to predict substance abuse by the World Health Organization’s Programme on Substance Abuse by adding cultural and environmental variables [19].

We have adapted the social stress model to frame most of our work in Engineers of Tomorrow for three reasons. First, we adapted this model because of its broad acceptance and research base in the United States and around the world. Second, we employed it because of its adaptability to substance abuse but also to other modes of ecological stress encountered by youth (drug abuse, smoking, bicycle and helmet safety, and, for our case here, the lack of peer models for STEM careers). Third, we used this model because it is rather easily understood as a way to show how youth adapt to their environments and make decisions. (As our review of literature quickly showed, this theoretical foundation has broad acceptance in other social science communities.)

In our adaptation, the social stress model suggests that a community by itself, or schools by themselves, or family units by themselves, rarely have the resources, expertise, training or resources to support sound decision making by youth (here, STEM career or college decisions). In impoverished and under-resourced Appalachian communities, the stressors are unique and include, as the literature review here suggests, poverty, out-migration, unemployment, lower college completion rates, lower family incomes, higher dependency rates, major industries in flux, isolation by geography, and others. We posit that age and culture-matched peers can moderate these stressors.

In short and if our model holds, Appalachian social networks, social competencies, and social resources directed at making STEM-oriented career choices can be addressed by a group of prevention methods we refer to as moderators. (For a review of a similar adaptation of the social stress model in West Virginia, see Fanner, et. al, 2008).

These stressors can probably be applied in non-Appalachian regions as well, but the model we selected fits especially well in Appalachian communities that are extensively rural, greatly impoverished, and have low college-going rates. All of these conditions exist widely in West Virginia. Even good students in these regions often have trouble finding a role model at school or in the family to assist with a STEM career choice.

For example, among social stressors to youth pursuing a STEM career, poverty and low college-completion rates would mean that a given youth will have few or no role models (brothers, sisters, uncles, parents, etc.) to consult with about college and dorm life, how to select courses, etc., let alone STEM or engineering careers. Youth in West Virginia often have few sources of community expertise on high-paying, high-tech careers. Low family income often means reduced opportunities to afford college. Fewer adult role models and community resources mean that students may never learn about scholarships that are available.
Our adaptation of the social stress model is illustrated in Figure 1, where "stressors" are the unique problems encountered by students living in the Appalachian region, and "interventions" are our responses to the problems ("moderator category" is a way to logically group the stressors). In understanding the model fully, it is important to note that we have tried to provide a solution (intervention) for each stressor, and that one of the interventions that keeps showing importance is peer influence. In the model we present here, an adaptation of the original Jason and Rhodes social stress model, we make heavy use of the influence of peers to help Appalachian youth make informed choices about careers, and about the particular value to their family, themselves and their communities represented by STEM career choices.

Appalachian Regional Stressors	Moderator Category [13,14]	Project Interventions
High unemployment	Social Networks	Peer influence Web course Summer camp
Low college completion rates		
Out-migration of college graduates	Social Competencies	Peer influence TIME Kits Calculus readiness Summer camp
Low family income		
Industries in flux	Social Resources	Peer influence Freshman program Summer camp
Geographic isolation		

Figure 1. Adaptation of the Social Stress Model to Appalachia STEM Students

After five years of pilots and program modifications, we think it makes the most sense to have young West Virginia high school students asking questions about STEM careers of other young, culturally-matched, age-matched, West Virginia undergraduate or graduate engineering students who have overcome some of the barriers themselves; who have the same regional accents; who share the same hunting stories and football rivalries; and who may be someday employed in the same industries back home. This wisdom comes in hindsight after senior faculty in our pilot EoT summer camp put campers to sleep talking about engineering careers or math tips. Replacing faculty with culture- and age-appropriate peers has changed everything, and we can demonstrate that it works.

Do peer mentors need to be strictly college students? We think not; advanced high school students who have mastered the college application process, ACT/SAT tests, etc., can offer great peer-to-peer insight to younger, less-experienced students. For a sample of those insights, see, "My View From the Trenches: Reflections About Peer Mentoring in the Information Age," attached here.

Research Objectives

In evaluating the adaptation of the social stress model to STEM career choices with respect to the effect of peer influence on Appalachia area high school students, we asked these questions:

1. What effect does peer influence have on learning math tips, SAT/ACT preparation, or challenging academic material when presented to high school students by peers during our EOT summer camp?

2. What effect does peer influence play when a high school student and family visit the College?

3. What effect does peer influence play when a student has academic difficulty and seeks assistance once at college?

4. Is having an engineer in the family a key influence on career path for these students?

Research Methods

A peer mentor is operationally defined as an advanced high school, undergraduate or graduate student who is *age-appropriate* (16 – 24 years old), *culture-appropriate* (Appalachian-born or raised); *major-appropriate* (engineering or one of the nine NSF-approved STEM majors at WVU); *and skill-appropriate* (peers who have mastered any academic subject(s) themselves). All were paid volunteers working around their own class schedules, so that fixed mentoring hours were almost impossible. Individuals serving as mentors also varied from 2006 to 2008 because some had graduated or gone on to internships or co-ops. These mentors taught or assisted in instruction or activities during the summer camp, and were resident advisors in the dorms and during evening recreation activities. They were paid volunteers selected to aid in providing information about admissions, testing, tutoring, career paths, college life, and similar topics. During the three years of NSF summer camp, plus two pilot years (five years total), we have had approximately 30 undergraduate, graduate and advanced high school students serve as peer mentors in the camp. Many of our engineering peer mentors are in touch with the summer camp participants year round on Facebook, MySpace, MyNextHorizon or via e-mail. About 66 percent have been female peer mentors; about 33 percent have been African-American; about five percent have been graduate students; about 10 percent have been advanced high school students.

The individual interventions represented as a whole by Engineers of Tomorrow (EoT) all have some sort of peer-led activity, except for TIME Kits (which are led by a high school math or science teacher, by definition, and reported elsewhere). In this paper, we examine noninferential, self-reported preference statements over three years of summer camp attended voluntarily by Appalachian high school students and the occasional advanced middle school student. A given student attended only a week's summer camp for one year. About 92 percent of these students attended West Virginia high schools and claimed an interest in a STEM career; there were no grade point requirements to attend the EoT summer camp. Students ranged in age from 13 to 18, and valid surveys numbered 213 over a three-year period. Students participated in the anonymous, IRB-approved surveys at the end of their week of activities as a post-test only. We have excerpted some of the survey results in Tables 1 – 5 that relate to the effectiveness of peer mentorship. Tables 6, 7 and 8 come from a smaller sub-survey that began only in 2008 (n = 53).

Research Results

Notes on results as presented: The authors collapsed categories below in Tables 1-5 to best represent how the students responded in a general way, not to reflect individual students or individual responses. The instrument was a forced choice, eliminating the option for neutral.

Table 1. I believe my math studying skills have increased.

Year		Frequency	Percent
2006	Neutral, Disagree, or Strongly Disagree	20	51.3
	Agree or Strongly Agree	19	48.7
2007	Neutral, Disagree, or Strongly Disagree	46	52.3
	Agree or Strongly Agree	42	47.7
2008	Neutral, Disagree, or Strongly Disagree	38	44.2
	Agree or Strongly Agree	48	55.8

Table 1 suggests that over three years, summer camp participants in 2008 agreed with the statement that their math skills had improved after the week of summer camp. In both 2006 and 2007, we changed the curriculum slightly, finally simplifying it in 2008. We expect the improvement shown in 2008 to continue into the next few years.

Table 2. I believe my skills in using Excel or Visual Basic have increased. *

Year		Frequency	Percent
2006	Neutral, Disagree, or Strongly Disagree	19	48.7
	Agree or Strongly Agree	20	51.3
2007	Neutral, Disagree, or Strongly Disagree	59	67.0
	Agree or Strongly Agree	29	33.0
2008	Neutral, Disagree, or Strongly Disagree	30	34.9
	Agree or Strongly Agree	56	65.1
	*Note: Visual Basic replaced Excel during the 2008 summer camp.		

Table 2 suggests that over three years, summer camp participants after 2007 generally agreed with the statement that their peer-taught Excel or Visual Basic skills have improved after the week of summer camp. When we switched to teaching only Visual Basic in 2008 (eliminating Excel), ratings improved significantly, possibly because we added two or three peer-assistants moving from student to student, and possibly because most summer campers had not yet been exposed to Visual Basic in the same way that many high school students are exposed to Excel. .

Table 3. I believe my skills using AutoCAD have increased.

Year		Frequency	Percent
2006	Neutral, Disagree, or Strongly Disagree	6	15.4
	Agree or Strongly Agree	33	84.6
2007	Neutral, Disagree, or Strongly Disagree	21	23.9
	Agree or Strongly Agree	67	76.1
2008	Neutral, Disagree, or Strongly Disagree	12	14.0
	Agree or Strongly Agree	74	86.0

Table 3 suggests that over three years, summer camp participants generally agree that their peer-taught AutoCad skills have improved after the week of summer camp. This summer camp module consistently showed up as the strongest of the self-reported skill improvements. We believe this can be attributed to the fact that the teaching module used two or three engineering undergraduates who moved from student to student assisting with the various drawings, making it highly personal and interactive. This module showed the same strong pattern in the two years of pilot studies we performed. Among the four topics shown in Tables 1-4, AutoCad was the only strong performer during faculty-taught pilot studies.

Table 4. I believe I have increased my understanding of the ACT and/or SAT tests.

Year		Frequency	Percent
2006	Neutral, Disagree, or Strongly Disagree	5	12.8
	Agree or Strongly Agree	34	87.2
2007	Neutral, Disagree, or Strongly Disagree	23	26.1
	Agree or Strongly Agree	65	73.9
2008	Neutral, Disagree, or Strongly Disagree	18	20.9
	Agree or Strongly Agree	68	79.1

Table 4 suggests that over three years, summer camp participants generally agreed that their peer-taught ACT/SAT test understanding improved after the week of summer camp. This summer camp module also shows consistently strong results over the three-year data collection.

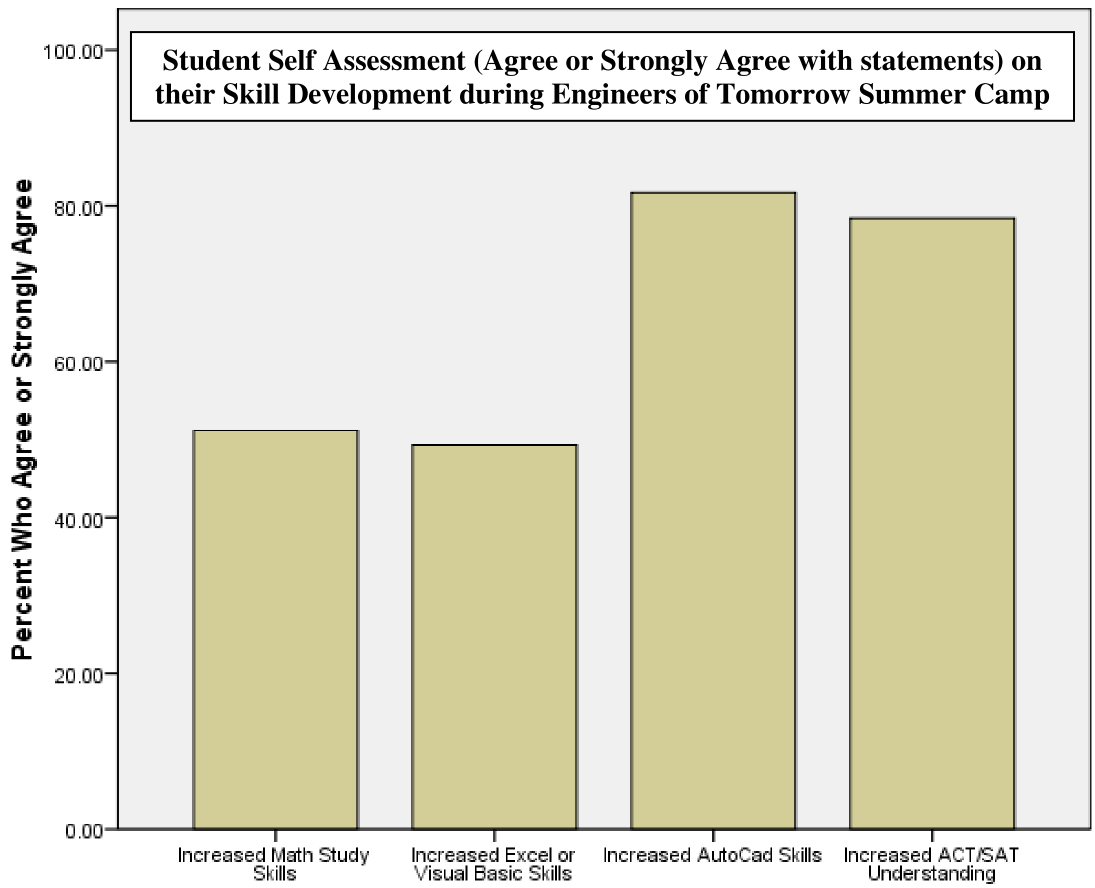

Figure 2. Summary Percentage of Students Agreeing or Strongly Agreeing that Summer Camp Teaching Modules Positively Impacted their Skills and Understanding in Targeted Areas

Figure 2 suggests that summer camp participants over a three-year period agreed or strongly agreed that their skills improved in peer-led, STEM-focused camp activities. It is reasonably clear that the value-added perceived by summer camp participants was consistent for peer-led modules, particularly the AutoCad and ACT/SAT preparation modules and Visual Basic for 2008.

Table 5. How often have your parent(s) or guardians been involved in discussing your career choices?

	Frequency	Percent
Never	1	.9
A Little	10	8.3
Somewhat	25	20.8
Often	42	35.0
Very Often	42	35.0

Table 5 (from a separate survey; n = 120) suggests that among summer campers, parents or guardians are fairly involved in career decisions among summer campers. The number of respondents in Tables 5 – 8 is lower (n = 53) because the staff introduced this survey only in 2008.

Table 6. When I visit WVU with my family to talk about college, I would prefer to talk to a

Gender		Frequency	Percent
Female	male engineering professor	0	0
	female engineering professor	5	22.7
	male engineering student	2	9.1
	female engineering student	9	40.9
	male WVU graduate working in the field	0	0
	female WVU engineering graduate working in the field	6	27.3
Male	male engineering professor	8	25.8
	female engineering professor	2	6.5
	male engineering student	12	38.7
	female engineering student	0	0
	male WVU engineering graduate working in the field	7	22.6
	female WVU engineering graduate working in the field	1	3.2
	multiple answers	1	3.2

Table 6 shows that regardless or gender, a student visiting the University to talk about engineering would prefer to talk to an engineering student (about 50 percent for girls and 45 percent for boys). Note that girls would prefer to talk first to a female student, then to a working female, then to a female professor, and then to a male student. Zero summer camp females selected “male professor” and only nine percent selected “male engineering student.”

Table 7. If I found myself having trouble with my college courses at WVU, I would prefer to have help from a:

Gender		Frequency	Percent
Female	male engineering professor	2	9.1
	female engineering professor	7	31.8
	knowledgeable male engineering student	5	22.7
	knowledgeable female engineering student	8	36.4
Male	male engineering professor	12	38.7
	female engineering professor	2	6.5
	knowledgeable male engineering student	12	38.7
	knowledgeable female engineering student	4	12.9
	multiple answers	1	3.2

Table 7 shows that, when having academic difficulties, summer campers vastly preferred to talk to a peer, and that among females, only nine percent would select a male professor. For boys, this difference was not nearly so plain, but boys still chose a student of either gender over a professor of either gender.

Table 8. How much did (an engineer in the family) influence your decisions to explore engineering as a career option?

Gender		Frequency	Percent
Female	no influence	0	0
	a little influence	7	31.8
	heavy influence	2	9.1
	Total	9	40.9
	no engineer in family	13	59.1
Male	no influence	5	16.1
	a little influence	4	12.9
	heavy influence	3	9.7
	Total	12	38.7
	No Engineer in family	19	61.3

In Table 8, we see that having an engineer in the family (nine girls and 12 boys) five of them were "heavily influenced" to explore engineering as a career option, or 24 percent. Most who attended camp did not have an engineer in the family.

Conclusion and Discussion

From Tables 1-4 above, and the summary Figure 2, we conclude that 213 summer camp students over a three-year period self-report that their skills designed to increase interest and ability in STEM careers increased when taught by peers. The modules that used roaming peer-assistants had the highest self-reported approvals (Visual Basic and AutoCad). Table 5 suggests that parents are actually heavily used in discussions of career choice – but what happens when parents themselves didn't attend college, as is so often the case in Appalachian families? We conclude that the student seeking information on career choice will necessarily seek information from other sources.

Tables 6 and 7 suggest that Appalachian summer camp students in a smaller, 2008 survey (n = 53) prefer to talk to an engineering student over an experienced professor when family is visiting campus, and even when the student is having difficulties in academic work. The preference for peer interaction trumps decades of academic experience represented by a professor for most of these students. Most interestingly, no female summer campers would choose male professors to talk about engineering during a family visit; only nine percent of the girls picked male professors for help during academic difficulties, overwhelmingly choosing a peer instead.

We see in Table 8 that most camp participants, male or female, do not have an engineer in the family, and that even when there is an engineer in the family, the participant would be "heavily influenced" about exploring engineering as a career option about 24 percent of the time. The interested student will seek information some place else. But where? In Tables 6 and 7 they tell us: they want information from peers.

We conclude that age- and culture-appropriate peers are one means of influencing STEM skills, and that having few or no role models in the family or community can be overcome by using peers where they are available. In the information age, and in heavily rural Appalachia, students have come to also rely on virtual communities of peers, such as Facebook or the brand-new MyNextHorizon.com, created specifically for Appalachian high school students with engineering and STEM career interest, and whose on-line mediators are engineering undergrads at WVU. We know from experience that West Virginia high school students are busy and stressed about college decisions: See the personal observations of one of our EoT peer mentors in the sidebar attached to this article as she failed to find information about engineering colleges from her local high school or community, and used Facebook and undergraduate engineering students to fill the void.

We also conclude that the math skill sessions only began working well when the curriculum was changed in 2008; likewise, Visual Basic seemed much more favored than the older Excel sessions in 2006 and 2007.

We recognize and the summer camp participants also recognize that there is a serious information gap for Appalachian high school students seeking information about STEM careers. But we now have data to suggest that the gap can actually be assuaged to a significant degree by exposing the young people to informed, culture-matched peer mentors while still in high school, by matching them up with peers when they arrive at the University, and by again matching them up with peers when they have academic difficulty.

But not all high school students interested in STEM careers can come to WVU for summer camp or even to visit the College. To answer that need, we have now extended our model to reverse the flow of STEM career information back to the student in three ways. First, we are taking two-hour, undergraduate-led, real-life engineering design exercises to the high schools; second, we have created a web-based, for-credit course in basic engineering (notions of design, career paths, ethics, etc.) to bridge the gap; and third, we have created an opportunity for high school teachers to create their own web-based engineering teaching modules called Tools for Integrating Math and Engineering, or TIME Kits.

As part of a full program evaluation of our EoT project, we are also collecting and reporting data on whether peer-led freshman physics homework sessions [20] and peer-led first-calculus homework sessions are useful in decreasing failure rates; these results are reported elsewhere, but the data suggest again that peer-led interventions are powerful tools.

We also recognize data and survey limitations: We don't know if there is a cause and effect relationship between peer influence and results. Likewise, we don’t have a random sample of students, nor do we have a random sample of undergraduates volunteering to be peer mentors. We suspect these confounds in inference are shared by other program evaluators.

Taken together, six of our seven NSF-EoT interventions are peer-led at West Virginia University. These interventions represent different ways of responding to social and economic deficits in Appalachia, deficits caused primarily by the lack of parent or community influences that might otherwise lead students to STEM career choices. That is, social stresses are moderated, if the theory holds, by moderators primarily provided by peer mentors.

We conclude that after three years, there has been a measurable, if small, growth in engineering enrollment. There are, however, confounds. For example, we do not know for certain whether these interventions have worked to increase STEM decisions among female or underrepresented minority students; we are also aware of the possible bias of self selection among those who choose to come to the summer camp. We are also aware that attending a summer camp may not directly lead to the choice of engineering for college, or persistence in engineering. Further research is needed.

Still, the social stress model has been a useful tool for structuring our interventions in the Appalachian setting, and in offsetting stressor unique to the Appalachian culture with stress moderators, namely peer-influence. In short, the model has been useful in addressing the need. And, on a number of measures, we conclude that the positive influence of peers in STEM career path or college major is clear.

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* Acknowledgement and Disclaimer:
"This material is based upon work supported by the National Science Foundation under Grant No. 0525484. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."

APPENDIX

My View from the Trenches: Reflections about Peer Mentoring in the Information Age

By Laura Winn

Today, I have to submit a proposal because I'm President of Italian Club. Later, I have to collect money for Russian Club and pass out topics for the debate team. Then, I need to submit my lesson plans for teaching elementary students for this afternoon. Later today, I have an hour-long Calculus test and a Physics mid-term. I'm tutoring another student during lunch. There's a National Honor Society meeting after school before swim practice until 8:00. And that's just my Monday at Waynesburg Central High School.

As a high-school senior, I've acutely felt the need to rise to the expectations of colleges, parents, teammates and friends by trying to excel in academics, sports and showing leadership in various extracurriculars. Around me, my friends and fellow college-bound seniors are doing the same. In fact, high school is not a 9-5 job. For many of us it has become an 8-11job, five days a week (not including Saturday practice and Sunday church). Perhaps this is why we seniors get so perturbed when, expressing our fatigue to teachers, we hear the typical, "Oh, I had to do it too," or the ever-so-popular, "Just wait until you have a REAL job!" But most of my teachers never had to do "it" so they don't understand how to balance "it" and use "it" effectively. Believe me, if a REAL job is only 9-5, we seniors can't wait to have REAL jobs.

What helps us cope? You use the fax; we use a text message. You use e-mail, we use Facebook. You call them "peer mentors" and I call them "friends."

In most ways, my childhood was just like everyone else's in Appalachia: I grew up on a farm which is a good fifteen minute drive from the nearest sleepy little town - that means a forty-five minute bus ride every day where I've seen probably five different girls get pregnant, a few of them twice. In fact, my county is said to have the highest teen pregnancy rate in Pennsylvania – a rare source of pride, I guess. And like most of my friends, I've received somewhere between three or four hundred letters, e-mails and phone calls from colleges anywhere from a local beauty school to Yale. Guidance counselors are forced to balance their time between the pregnant girls, drug-addicts and us college-bound students, for whom they're then expected to know about thousands of colleges and college-majors. I can tell you this: they don't understand what it means to apply to engineering.

Days after I turned fourteen, I arrived in high school with a vague idea that I wanted to both join the military, and go to college in engineering. I observed the seniors around me who were making their own big decisions. That's when I met Brad; I'd heard that Brad was off to some 'West Point' place next year, but I hadn't the foggiest idea about West Point. So, painfully shy as I was, I texted Brad. Brad came back with a lot of information. I figured that if the Army had its own college, maybe the Navy would too. And sure enough, an old friend of mine had a brother, *Chris, who was a freshman at the Naval Academy (USNA) and with whom I now correspond, true to our generation, via Facebook and text-message. A third friend calls me regularly from the Air Force Academy to update me on his experience there. How, with all the information, guidance counselors and letters from a zillion colleges, was I able to sort through the mass of information about selecting a college and engineering as a major? For me, it was friends and classmates. Oh yes, sorry, you call them, "peer mentors."*