2022

Modifying Practices to Serve Underrepresented Preprofessional Students with Help from Gifted Education

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Abstract: Gifted education and honors education often parallel one another. By using a theoretical construct from gifted education as guidance, honors colleges could adjust their programs to spark interest and expedite talent development of minorities in STEM and health preprofessional tracks. Small improvements include adjusting advising models, using phenomena-based teaching practices to frame science content in a more feminine context, and making room for indigenous epistemologies in coursework. Adjustments to honors programs may bridge the gap between honors and preprofessional tracks while helping to increase diversity in STEM professional fields.

Keywords: higher education—honors programs & colleges; City as Text™; Achievement Orientation Model; STEM education; Georgia Southern University (GA)—Honors College

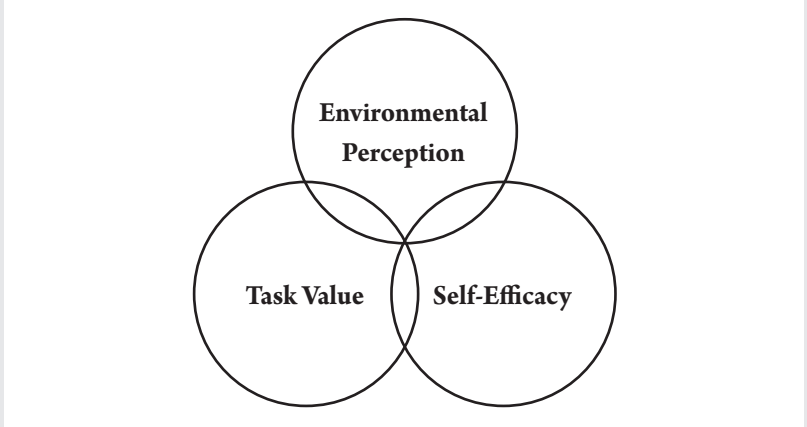
Citation: *Journal of the National Collegiate Honors Council*, 2022, 23(2): 45–53

The overlap between gifted students and honors colleges is not new, and views are still divided. Some argue in favor of merging the two fields (Colangelo, 2018) while others reason that differences between the two should be maintained (Guzy, 2018). While this article does not aim to solve the problem, honors colleges can look toward conceptual theories in gifted education to motivate key groups in honors programs that are not reaching their full potential. The Achievement Orientation Model, a theoretical construct from gifted education, can combat gifted underachievement and organize strategies to amplify the voices of underrepresented groups on the STEM preprofessional track.

Building a better preprofessional honors experience begins with finding ways to motivate students. One suggestion is to target gifted underachievers. Stereotypical gifted students are already seeking the honors programs in preprofessional colleges, but it could be beneficial to focus outreach efforts on those students with high potential but little motivation to pursue a STEM career. The Bureau of Labor Statistics (2020) estimated that of the 12 million workers in the U.S. STEM workforce, only 34% are women, 8.5% identify as Black or African American, and a meager 0.4% identify as Native American. Honors programs should focus on the untapped potential in groups with such low representation in the STEM workforce.

The Achievement Orientation Model (AOM)—developed by Del Siegle and Betsy McCoach (2005), leading researchers in gifted education—was created as a tool to guide programs in sparking motivation and increasing talent development. The theoretical model identified three overlapping areas to spark motivation in learners: (1) supportive environment; (2) self-efficacy; and (3) meaningful tasks (see Figure 1) (Siegle & McCoach, 2005). Honors colleges across the country have, probably inadvertently, developed strategies to address these three areas to support and challenge students, but they can take cues from research to build marginalized students' environmental perception, self-efficacy, and valuation of tasks.

Figure 1. Achievement Orientation Model



Note: Figure adapted from "Applying the Achievement Orientation Model to the Job Satisfaction of Teachers of the Gifted," by D. Siegle, D. B. McCoach, & K. Shea.

ENVIRONMENTAL PERCEPTION

Students who do not feel safe, welcomed, or supported will not thrive in their environment. Research has shown that a sense of belonging and a positive STEM identity can be associated with interest and retention in STEM fields (Rainey et al., 2018). Preprofessional honors programs can help minority students feel welcomed in a supportive STEM environment with small adjustments to the honors college advising models.

Various honors advising models have taken shape across the country. For example, Barrett Honors College at Arizona State University provides its first-year, transfer, international, and online honors students with three mentors, which they call the "three-pronged approach" (*Advising and Requirements*, n.d.). The honors advisor helps students manage expectations of the college; a staff advisor guides the students in getting through their degree program; and a faculty honors advisor helps with finding research opportunities, presenting at conferences, and preparing for graduate school. The advising process can go one step further to help support underrepresented STEM majors by matching students with STEM professionals of their own gender and ethnicity to promote effective encouragement (Kricorian et al., 2020). The 2020 study qualitatively explored factors influencing participation of underrepresented students in STEM fields (Kricorian et al., 2020) and found that 62% of the 48 adults currently pursing STEM (mostly females) were able to name a white male STEM professional while fewer than 30% could name an African American or Hispanic STEM professional of any gender (Kricorian et al., 2020). Fewer than a third of participants felt that students in their STEM classes were like them. Not having role models or like-minded peers makes it hard to establish a positive environmental perception within a STEM classroom.

Kricorian et al. (2020) suggested using social media as a "potential pathway" (p. 7) for mentorship as participants were three times more likely to name an African American female social media influencer than a STEM professional. Females and minority STEM professionals can help preprofessional students develop a positive self-identity in STEM. Honors colleges can and should be cognizant of the diversity of available mentors to best support minority students in preprofessional fields. The use of technology and social media may be a creative way to help the already small number of females and minority STEM professionals reach the highest population of mentees possible.

SELF-EFFICACY

All people, identified as gifted or not, need to believe they are able to complete a task before being successful. Tenacity, rigor, and focus cannot occur if students believe the goals are unattainable. Honors colleges provide opportunities for students to focus on problem solving while strengthening individual talents through courses, lecture series, and research opportunities. One way to increase self-efficacy among preprofessional students is to adjust courses and learning opportunities to account for interests of minority students in STEM preprofessional fields.

Kerger, Martin, and Brunner (2011) suggest that the distinct gap between the number of males and females in STEM fields could arise because scientific subjects are perceived as more masculine. The result may leave females feeling unable to succeed in a STEM preprofessional major. Small changes to core content or elective courses could change the context and enhance female interest in scientific topics.

Honors programs across the country offer a wide range of courses to enhance problem solving in relation to contemporary issues. For example, Barrett Honors College has developed signature courses to provide opportunities for students to engage in complex, creative, and learner-centered thinking (Barrett, The Honors College Overview and Requirements, n.d.). Schreyer Honors College, housed at Pennsylvania State University, provides additional opportunities for research with the goal of students presenting their work at conferences in front of an authentic audience. The offering of high-level courses does nothing to motivate students if the topics and context do not pique their interest. Kerger, Martin, and Brunner (2011) found that when offered a selection of science-related courses, a statistically significant number of females chose topics framed in the female context as opposed to the standard or male context (see Table 1); this was especially true in fields such as physics and statistics, which have historically been proven to have a clogged pipeline for females.

Not all courses can be adjusted to the female perspective, and based on the findings, such an adjustment would negatively impact male interest (Kerger, Martin, & Brunner, 2011). The authors suggest offering separate male and female science courses, but that option is problematic to educators. Another option could be to offer online courses with similar objectives but under a different context. The best option could be to capitalize on phenomena-based science teaching promoted by Next Generation Science Standards:

students choose a phenomenon to investigate, engage in similar lessons, and collaborate in using what they have learned to explain the natural, puzzling phenomena presented at the beginning of the unit. Male and female context should be represented in the phenomena offered to students. The strategy offers ample room to contribute based on interest and to engage in higher order thinking while using the same content lessons. Capitalizing on female and male interests could build students' self-efficacy and encourage students to pursue and remain in a STEM preprofessional field.

TASK VALUE

Task valuation seems common sense in motivating students but is often overlooked in education (Brigandi et al., 2016). Honors colleges consistently offer students opportunities to engage in extracurricular activities, a variety of course offerings, and open-inquiry projects created to promote a sense of ownership by students. An additional step honors colleges could take to engage preprofessional STEM and health students includes valuing alternative epistemologies, which could help improve the retention of Native Americans, a

Table 1. Examples of Female and Male Context of Topic

Topic	Feminine Context	Male Context
Physics	Learn how to save energy in everyday life	Reflect on why red light has more energy than blue light
	Explain how the different figures originate in fountains	Explain how taps can provide water on the upper floors of a house, even when the water pipes lead to the basement
	Learn more about the origins of azure and afterglow	Reflect on the various possibilities to break light
Statistics	Calculate the difference in intelligence between boys and girls	Calculate the probability of a car accident
	Analyze what kinds of connections there are between poverty and birth rate	Analyze which factors had an influence on gas prices
	Calculate in which countries medical care is more successful	Calculate the annual interest of a savings account

Note: Table adapted from "How Can We Enhance Girls' Interest in Scientific Topics?" by S. Kerger, R. Martin, & M. Brunner.

significant minority in STEM fields, in preprofessional tracks. The humanities openly value alternative ways of knowing, but unfortunately STEM and health fields continually disadvantage students within the disciplines' valued epistemologies. Promoting alternative epistemologies is especially important in honors programs, where students are more likely to crave creative answers and are better equipped to internalize abstract concepts. Options to capitalize on alternative perspectives while promoting STEM and health preprofessional tracks to Native American populations need to take place in honors-specific courses.

In 2020, Barrett Honors College offered courses such as "Art Journaling & Mindfulness," "Critical Thinking for Critical Times—Data modeling and Covid 19," and "Economic Uncertainties of Covid-19" to motivate a variety of students with current issues and authentic questions (Arizona State Course Catalogue, n.d.). Courses at Barrett and at other honors colleges are continually evolving dependent on contemporary issues. STEM and health courses should do the same.

Cech et al. (2017) conducted qualitative interviews exploring Native American perspectives while enrolled at two U.S. research universities. The researchers concluded that students felt their indigenous epistemologies were devalued and delegitimated. Native students felt silenced. Even when the hope of most students was to give back to their respective tribes upon graduation, they first had to accept that their indigenous epistemology was no longer of value in STEM and health fields. Students were forced to choose between upholding native traditions and completing class assignments. Motivation is sure to be lost when students are told that their past experiences and knowledge are no longer of value.

Cech et al. (2017) reported finding three themes that emerged and should be considered when making room for indigenous epistemology in STEM and health fields, thus helping students avoid the internal struggle they face when trying to negotiate how to blend two conflicting ways of knowing.

- First, indigenous epistemologies draw from a participatory relationship with nature. Humans learn from the natural world as opposed to the dominant scientific way of knowing, which places the origin of knowledge solely in humans.
- Second, indigenous knowledge recognizes and embraces the "flow and chaos" (p. 748) of the natural world whereas traditional scientific beliefs aim to classify and isolate findings.

- Third, indigenous epistemologies prioritize relationships with the natural world as opposed to gaining knowledge only for knowledge's sake.

Without taking the indigenous perspective into account, "learning science within US higher education is thus simultaneously learning what counts as 'real' knowledge and learning to devalue alternative ways of knowing" (p. 749).

The authors suggest implications of the three themes such as recognizing advancements made through alternative epistemologies; openly discussing imperialism and scientific advancements made through the exploitation of Native Americans and native land; and promoting chapters of national organizations such as the American Indian Science and Engineering Society and the Society for Advancement of Hispanics/Chicanos and Native Americans in Science (Cech et al, 2017). An honors college provides an already existing structure of support to promote service-based or independent research projects that value and amplify voices and ways of knowing from diverse populations. Examples of courses that can accomplish such tasks include the University of North Dakota's Indigenous Health Program, which offers courses such as "Indigenous Leadership & Ethics" or "Principles of Indigenous Health"; such courses are excellent places to start for programs looking to appeal to those who value indigenous wisdom (*Coursework: Indigenous Health PhD Curriculum*, n.d.).

Siegle and McCoach's Achievement Orientation Model (2005) provides a conceptual framework to address the social, emotional, and intellectual needs of gifted underachievers and can be used to guide practices to best support minorities in STEM preprofessional fields. Research has repeatedly proven that STEM fields are missing diversity in gender and race. Adjusting practices to encourage a sense of belonging, capture interest, and value alternative epistemologies can and should be addressed to best support and retain minority students on STEM preprofessional tracks.

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